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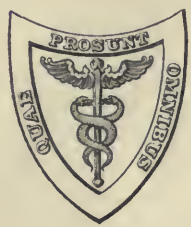
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Contributors who wish their articles to appear in the next number are requested to forward them before the 1st of February.

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The following works have been received for review:—

Zur Diagnostik der Augenkrankheiten mit Bezug auf Lokalisation von Cerebro-spinalleiden. Von Dr. L. GROSSMANN.

Ein Neues Fleischpepton. Nahrungsmittel und Genussmittel für Kranke und Gesunde von Dr. W. KOCIS. Mit 7 Tafeln. Bonn: von Max Cohen & Sohn, 1884.

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The Basic Pathology and Specific Treatment of Diphtheria, Typhoid, Zymotic, Septic, Scorbutic, and Putrescent Diseases generally. By GEORGE J. ZIEGLER, M.D. Philadelphia: George J. Ziegler, 1884.

Contributions to the Anatomy and Pathology of the Nervous System. Singular Case of Vertebral Disease. By RICHARD MOLLENHAUER, M.D.

One Aspect of the Subject of Medical Examination as set forth in the North Carolina Board of Medical Examiners. North Carolina Board of Health.

Listerism in Obstetrics. Shall we adopt it in General Practice? By W. SHARP, M.D., Volcano, W. Va.

Report on a Case of Acute Mania. Treatment in the Acute Stage by Exercise and Feeding. Recovery. By ALEX. NELLIS, Jr. M.D., Williard, N. Y.

The Ambulance Movement in Scotland. By JAMES WHITSON, M.D., F.F.P. and S.G., F.R.M.S., Glasgow.

Successful Cesophagotomy for the Removal of Foreign Bodies. By LEROY MCLEAN, M.D., Troy, N. Y.

The Influence of Climate on the Treatment of Chronic Catarrh of the Middle Ear. By JOHN F. FULTON, M.D., Ph.D., of Chicago.

Madness and Crime. By CLARK BELL, Esq., of New York,

Explanation of the Pathology and Therapeutics of the Diseases of the Nerve Centres, especially Epilepsy. By J. M. F. GASTON, M.D., of Atlanta, Ga.

Case of Chronic Purulent Inflammation of the Middle Ear giving Rise to Intracranial Disease—Double Optic Neuritis—Recovery. By Dr. JOHN C. FULTON, St. Paul, Minn.

On Oxygen as a Remedial Agent. By SAMUEL S. WILLIAMS, A.M., M.D.

Club-Foot. Is Exsection of the Tarsus necessary in Children? By DE FOREST WIL-
LARD, M.D.

Force *v.* Work. Some Practical Remarks on Dietetics on Disease. By WILLIAM PEPPER, M.D., LL.D.

The Dry Treatment of Chronic Suppurative Inflammation of the Middle Ear. By CHARLES J. LUNDY, A.M., M.D.

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The Rational Treatment of Chorea. By JOHN VAN BIBBER, M.D., of Baltimore, Md.

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Muriate of Cocaine in Ophthalmic Surgery. By C. J. LUNDY, A.M., M.D.

Transactions of the American Otological Society, Seventeenth Annual Meeting. Vol. III. Part 3. New Bedford, Mass., 1884.

Transactions of the Medical Association of the State of Alabama. The Report of the Board of Health. Thirty-sixth Annual Session.

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Annual Report of the Surgeon-General of the United States Army, 1884.

Fourth Annual Report of the State Board of Health of New York. Albany, 1884.

The following Journals have been received in exchange:—

Γαλῆνος. Bibliothek for Læger. Kronika Lekarska. Annali Universali di Medecina e Chirurgia. Archivio di Orthopedia. El Ensayo Medico. Gazzetta degli Ospitali. Nordiskt Medicinskt Arkiv. Upsala Lakareforenings Fordhandlingar. Giorn. Ital. Mal. Ven. Revista Internaz. di Med. e Chir. Commentario Clin. Mal. Genito-Urin. Boletin de Ciencias Médicas. L'Imparziale. Lo Sperimentale. Rivisit. Veneta di Sci. Med. O Correio Medico de Lisboa. Cronica Medico-Chirurgica de la Habana. Uniao Medico. La Union Medica, Caracas. Allgemeine Wiener med. Zeitung. Berliner klinische Wochenschrift. Centralblatt für Chirurgie. Centralblatt für Gynäkologie. Centralblatt für klinische Medizin. Centralblatt für die medicinischen Wissenschaften. Centralblatt für die gesammte Therapie. Deutsches Archiv für klinische Medizin. Deutsche medicinische Wochenschrift. Medicinisch-Chirurgisches Centralblatt. Medizinische Jahrbücher. Monatsheft für prak. Dermatol. Wiener med. Presse. Wiener Klinik. Zeits. für physiol. Chemie. Annales de Dermatologie et de Syphiligraphie. Annales de Gynécologie. Annales des Maladies Genito-Urinaires. Annales des Mal. de l'Oreille, etc. Archives de Méd. et Pharm. Militaires. Archives de Toxicologie. Archives Générales de Médecine. Bulletin Générale de Thérapeutique. Gazette Hebdomadaire. Gazette Médicale de Nantes. Gazette Médicale de Paris. Gazette Médicale de l'Orient. Gazette Hebdom. de Montpellier. Journal de Médecine de Paris. L'Abeille Médicale. L'Encéphale. Le Progrès Médical. L'Union Médicale. Revue de Chirurgie. Revue de Médecine. Revue de Thérapeutique. Revue des Sciences Médicales. Revue Médicale Française et Étrangère. Revue Mensuelle de Laryngologie. Union Médicale et Scientifique du Nord-Est. The Asclepiad. Brain. Braithwaite's Retrospect. British Medical Journal. Dublin Journal of Medical Science. Edinburgh Medical Journal. Glasgow Medical Journal. Journal of Physiology. Journal of Psychological Medicine. Lancet. Liverpool Medico-Chirurgical Journal. London Medical Record. Medical Times and Gazette. Midland Medical Miscellany. Ophthalmic Review. Practitioner. Proc. N. W. Provinces and Oudh Branch. Australian Medical Journal. Indian Medical Gazette. Bristol Medico-Chirurgical Journal.

Alienist and Neurologist. American Druggist. American Journal of Insanity. American Journal of Neurology and Psychiatry. American Journal of Obstetrics. American Journal of Pharmacy. American Journal of Science. American Journal of Dental Science. American Medical Digest. American Practitioner. Analectic. Archives of Medicine. Archives of Ophthalmology. Archives of Otology. Archives of Pediatrics. Atlanta Medical and Surgical Journal. Boston Medical and Surgical Journal. Boston Journal of Chemistry. Buffalo Medical and Surgical Journal. Chicago Medical Journal and Examiner. Cincinnati Lancet and Clinic. Cincinnati Medical News. College and Clinical Record. Columbus Medical Journal. Dental Cosmos. Denver Medical Times. Detroit Lancet. Druggists' Circular. Ephemeris of Materia Medica, Pharmacy, and Therapeutics. Fort Wayne Journal of Medical Sciences. Iowa State Medical Reporter. Journal of the American Medical Association. Journal of Cutaneous and Venereal Diseases. Journal of the Franklin Institute. Journal of Nervous and Mental Diseases. Independent Practitioner. Kansas City Medical Record. Kansas Medical Index. Louisville Medical News. Maryland Medical Journal. Medical Age. Medical Annals. Medical Herald. Medical News. Medical and Surgical Reporter. Medical Record. Mississippi Valley Medical Monthly. Nashville Journal of Medicine and Surgery. New Medical Era and Sanitarian. New Orleans Medical and Surgical Journal. New York Medical Journal. North Carolina Medical Journal. Obstetric Gazette. Pacific Medical and Surgical Journal. Popular Science Monthly. Philadelphia Medical Times. Rocky Mountain Medical Times. Physician and Surgeon. San Francisco Western Lancet. Sanitarian. Sanitary Engineer. Sanitary News. Pharmaceutical Record. Quarterly Journal of Inebriety. Southern Practitioner. St. Louis Courier of Medicine. St. Louis Medical and Surgical Journal. Texas Courier of Medicine. Therapeutic Gazette. The Polyclinic. Virginia Medical Monthly. Weekly Medical Review. Western Medical Reporter. Canadian Practitioner. Canada Lancet. Canada Medical Record. Canada Medical and Surgical Journal. L'Union Médicale du Canada.

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2. A Text-book of Practical Medicine, designed for the use of Students and Practitioners of Medicine. By Alfred L. Loomis, M.D., LL.D., Professor of Pathology and Practical Medicine in the Medical Department of the University of the City of New York. 8vo. pp. 1102. 211 Illustrations. New York: Wm. Wood & Co., 1884.
3. A Treatise on the Theory and Practice of Medicine. By John Syer Bristowe, M.D., LL.D., F.R.S., Fellow of the Royal College of Physicians; Senior Physician to, and Lecturer on Medicine at St. Thomas's Hospital, London. 8vo. pp. 1240. Fifth edition. London: Smith, Elder & Co., 1884

- XVII. Malaria and Malarial Diseases. By George M. Sternberg, M.D., F.R.M.S., Major and Surgeon U. S. Army; Member of the Biological Society of Washington; late Member of the Havana Yellow Fever Commission of the National Board of Health; Corresponding Member of the Epidemiological Society of London, etc. 8vo. pp. 329. New York: William Wood & Co., 1884

- XVIII. Clinical and Pathological Observations on Tumors of the Ovary, Fallopian Tube, and Broad Ligament. By Alban H. G. Doran, F.R.C.S., Assistant Surgeon to the Samaritan Free Hospital, formerly Anatomical and Pathological Assistant to the Museum of the Royal College of Surgeons of England. With thirty illustrations. 8vo. pp. 189. London, 1884

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XXI. On Tumors of the Bladder, their Nature, Symptoms, and Surgical Treatment. By Sir Henry Thompson, F.R.C.S., M.B. Lond., Surgeon Extraordinary to H. M. the King of the Belgians, Professor of Surgery and Pathology to the Royal College of Surgeons. Consulting Surgeon to University College Hospital, etc. 8vo. pp. 111. Philadelphia: P. Blakiston, Son & Co., 1884	202
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2. On Bedside Urine Testing, including Quantitative Albumen and Sugar. By George Oliver, M.D. 2d edition. London, 1884.	
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ARTICLE I.

INJECTION OF FINELY POWDERED INORGANIC MATERIAL INTO THE ABDOMINAL CAVITY OF RABBITS DOES NOT INDUCE TUBERCULOSIS. AN EXPERIMENTAL RESEARCH. By GEORGE M. STERNBERG, Major and Surgeon, U. S. A., WITH PATHOLOGICAL NOTES by WM. T. COUNCILMAN, Associate in Pathology, Johns Hopkins University.

WHEN Koch first announced to the world his discovery of the tubercle bacillus, and gave an account of the experimental evidence which had convinced him of its essential etiological relation to the disease tuberculosis, it was natural that conservative physicians should demand additional evidence and confirmation from other sources before accepting his conclusions, notwithstanding the reputation which he had already established as an expert and conscientious investigator. The special reasons for exercising an unusual degree of scientific scepticism in accepting Koch's account of the etiology of this disease were stated by the writer in the following language in a paper published in *The Medical News*, July 1, 1882:—

“Koch began this investigation as an *expert*, familiar from long practice with the technique of culture experiments and microscopical investigations with the highest powers. Probably no man living was better fitted by natural aptitude and past experience for carrying out an experimental research of this kind, and certainly very few would have been able to command as great confidence in the result announced in advance of confirmation by other observers. Still this confirmation is necessary in order to establish the discovery of Koch among the demonstrated truths of medical science. This is all the more essential, inasmuch as other observers—Klebs and Toussaint—have found in their experimental researches, organisms, *micrococci*, believed by them to be the agents of tuberculous infection, which differ morphologically from those—*bacilli*—described by Koch; and more especially because it has been demonstrated by repeated experiments that a

disease closely resembling tuberculosis, if not identical with it, may be produced in animals by inoculation with a variety of organic products of non-tubercular origin, and even by the inhalation of inorganic particles. Thus Brunet¹ inoculated seven rabbits with cancer, six with simple pus, and six with tuberculous matter. Of these, fourteen became tuberculous, viz., six of those inoculated with cancer, three of those inoculated with pus, and five of those inoculated with tuberculous matter.

Shottelius² found that miliary nodules in the lungs resulted, in dogs, alike from the inhalation of the pulverized—spray—sputum of phthisis and of bronchitis.

Toussaint affirms that the tubercular deposits resulting from inoculation with non-tubercular material are not infectious, and that experimental pseudo-tuberculosis may be distinguished from tuberculosis proper by inoculation experiments, although the pathological anatomy of the two diseases is identical.

If we accept the view that the tubercle nodules are of inflammatory origin, we can readily understand how both living and non-living particles may give rise to local inflammatory processes, resulting in similar pathological products, and the infectious or non-infectious character of these products would then be explained by the presence or absence of living organisms, in accordance with the views of Burdon-Sanderson,³ who says, '*Whenever an inflammation becomes infectious, it owes that property to chemical change in the exudative liquid, of which the presence of microzymes is a necessary condition.*'

The weight of experimental evidence seems to the writer to favor the view that the specific properties of Koch's bacillus depend upon its ability to locate itself in certain situations, rather than in any power to produce a special kind of inflammation, giving rise to products having specific characters. If this is the case, we should expect that other organisms capable of locating themselves in the same situations would likewise give rise to tubercular neoplasms. In a recent communication to the French Academy of Sciences, we have evidence presented that such is the case.

M. Laulainé,⁴ in a note presented by M. Bouley, on the 2d of January of the present year, makes the following statements:—

The author had recently observed in the lungs of a dog the alterations produced by the eggs of a nematoid worm, the *strongylus vasorum* (Baillet), which possess great interest, because of their apparent identity with those of tuberculosis. These *strongyles* in the adult state live in the right ventricle and in the larger divisions of the pulmonary artery. Here they are massed together in balls of greater or less magnitude, which consist of individuals of both sexes. These masses are restrained from being washed away by the blood current by anastomosing fibrous bands, which are developed as the result of an endarteritis, which is infallibly produced by the presence of the parasites. The fertilized eggs emitted by the females in these tangled masses in the central part of the circulation, are carried along by the current to the smallest arteries and capillaries, where they are arrested and where the embryos are born. These emigrate immediately to the smaller bronchial tubes. The lungs of dogs infested with this parasite are filled with fine gray granulations, the histological characters of which are described by the author as follows:—

'The eggs and the embryos arrested in the smallest *arterioles* become the point of departure of a nodular arteritis, presenting in its structure all the characters assigned, since Köster, to the elementary follicles of tuberculosis. At the centre of each nodule is found an egg or an embryo inclosed in a giant cell, this is surrounded by a more or less abundant collection of *epithelioid* cells or by an exterior embryonic zone which tends frequently to become fibrous.'

The author points out that this pseudo-tuberculosis affects especially the base

¹ Sur la tuberculose expérimental, C. R. A. des Sciences, t. xciii. p. 447.

² Experimentelle Untersuchungen über die Wirkung inhalirter Substanzen. Archiv f. Path. Anat. und Phys. lxxiii. p. 524.

³ The Lumleian Lectures on Inflammation. British Medical Journal, April 15, 1882, p. 527.

⁴ Sur une tuberculose parasitaire du chien et sur la pathogénie du follicule tuberculeux. C. R. Ac. des Sci., i. xciv. p. 49.

of the pulmonary lobes, differing in this respect from true tuberculosis which is located by preference at the summit.

The present writer intends to repeat the experiments of Koch, if circumstances and the limited facilities now at his command enable him to do so, and if any results are attained worthy of record, proposes to communicate them in a second paper to which this will serve as an introduction."

In attempting to carry out the intention above announced, the writer, being stationed at a military post on the Pacific coast, and depending entirely upon his own resources, met with difficulties which prevented him from completing his self-imposed task. Many minor difficulties were encountered, among which may be mentioned that of obtaining animals for experimental purposes, and the consciousness that public sentiment in the garrison was opposed to experiments of this nature, the importance of which was not appreciated, while exaggerated ideas of the sufferings of the animals were entertained, *especially by the commanding officer's wife*. But the main difficulty encountered resulted from the absence of gas, and of a suitably constructed culture oven, and a consequent failure to obtain cultures of the bacillus after all of the preceding steps in the investigation had been carried out in a successful manner.

The bacillus was found in tuberculous sputum. Rabbits and guinea-pigs were inoculated with sputum of phthisical patients, and characteristic tubercle nodules were found in the lungs and liver as a result of such inoculations; but when these nodules were placed with due precautions upon the surface of sterilized blood serum, prepared as directed by Koch, they remained for weeks without the appearance of any scales made up of bacilli, such as Koch described in his first report and has since represented in the beautiful chromo-lithographs¹ illustrating his recent elaborate memoir published in the second volume of The Report of the Imperial Board of Health of Germany.

This failure to obtain cultures was doubtless due to imperfect regulation of temperature in the improvised culture-chamber, which, in the absence of anything better, I attempted to use, and which answered very well for the cultivation of various other micro-organisms less susceptible to slight variations of temperature.

To repeat the attempt at the present time would be simply a matter of personal gratification, for the possibility of cultivating the bacillus through successive generations has been demonstrated beyond question, not only by Koch and his assistants, but by Watson Cheyne, of London, and quite recently in our own country by Dr. Ernst, of Massachusetts. I cannot, however, admit that the experiments of the last-named gentleman, detailed in his interesting paper in the October number of this journal, are by themselves convincing as to the essential etiological rôle of the bacillus in the production of tuberculosis; for, in my opinion, considerably more

¹ The writer has taken the liberty of introducing into the second edition of his work on "Bacteria," a chromo-lithographic plate in which the figures have been accurately copied from some of those above referred to.

than three successive cultures must be made in order to insure the exclusion of any trace of the original material, especially in the case of an organism, which develops as slowly as does the tubercle bacillus, and which extends but a limited distance from the point of inoculation upon the surface of a solid culture medium.

But Koch himself has carried these cultures so far, and has multiplied his inoculation experiments with "pure cultures" to such an extent that the experimental evidence seems unimpeachable. Thus, by reference to his latest report, above referred to, we find that in one series of experiments sixteen successive cultures were made during a period of twelve months, the original material being obtained from a cavity in a phthisical lung. Seventeen guinea-pigs were inoculated with the sixteenth culture, and all became tuberculous and died within six weeks. In another experiment four guinea-pigs were inoculated successfully with the twenty-sixth culture, the original material having been obtained from a human lung eighteen months previously. These examples represent but a small portion of the experimental evidence recorded in the report referred to, and the writer confesses that since he has become familiar with this evidence the last remnant of scepticism has been removed from his mind, and he now recognizes not only that tuberculosis is an infectious disease—a fact which had been prettily well demonstrated prior to Koch's discovery, and which I have repeatedly verified by inoculation experiments with phthisical sputum—but also that it is a parasitic disease, due to the presence in the body of an infected animal of the *Bacillus tuberculosis*.

This brings us to the question of the *modus operandi* of the bacillus in producing the infectious disease, tuberculosis. Does it act simply as a mechanical irritant, as maintained by Formad, of Philadelphia? and may it be replaced by other non-living mechanical irritants, as he claims to have demonstrated? or does the pathogenic power of the bacillus depend upon specific physiological characters peculiar to it?

By referring to the extract from a previous paper, quoted on page 17, it will be seen that two years ago the writer was inclined to favor the first mentioned view, inasmuch as it seemed to be supported by a considerable amount of experimental evidence, and because other experimenters—Klebs and Toussaint—had claimed to produce tuberculosis by inoculations with pure cultures of a different micro-organism. But to-day I feel compelled to admit that experiments made prior to the discovery of Koch's bacillus, especially when these were made in laboratories long in use for various pathological researches, can be accorded but little value on account of the great liability to accidental contamination of material used for inoculation experiments, or the subsequent infection of animals experimented upon through the wound made in these experiments. We now know that such experiments can have no scientific value in the absence of special precautions to prevent such accidental inoculation, which precaution no one thought of taking prior to the discovery of the tubercle bacillus.

But since this famous discovery was first announced, Dr. Formad, of Philadelphia, has repeatedly and emphatically declared that he is able to produce tuberculosis in rabbits, and in other animals, by injecting into the cavity of the abdomen, finely powdered inorganic material, such as glass, or ultramarine blue. This statement, coming from a pathologist of Dr. Formad's reputation, has had considerable weight with the writer, notwithstanding the fact that a detailed account of the experiments upon which it is founded has not yet been published. Being, then, still in doubt with reference to this important point, I determined, soon after the meeting of the American Medical Association in Washington, in May last, to repeat Dr. Formad's experiments with such precautions as would insure the exclusion to tubercle bacilli, and thus render it certain if a positive result was obtained that it was due solely to the inorganic particles introduced and not to accidental contamination of the material injected.

The main object of the present paper is to give an account of these experiments, which my assignment to duty in Baltimore, in June last, enabled me to carry out without delay, and with the co-operation of a competent pathologist, whose valuable assistance I hereby acknowledge, and whose notes relating to the pathological results of the injections made are embodied in the present paper. I am also indebted to Dr. Councilman for facilities for keeping my rabbits in the country under such circumstances as seemed to preclude the possibility of accidental inoculation with tubercle bacilli. The biological laboratory of Johns Hopkins University, where I have been engaged in other experimental work during the past summer, is a new building, and the animals might, perhaps, as well have been kept in it, an arrangement which would have been decidedly more convenient. But to avoid all possibility of accidental contamination the rabbits purchased especially for the experiment—fifteen in number—were sent directly to Dr. Councilman's home in the country, about eight miles from Baltimore, and were there placed in the loft of a storehouse, which had not previously been used for any similar purpose.

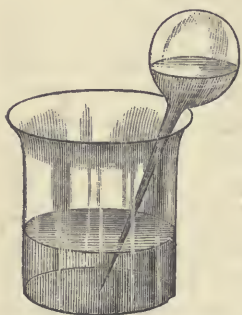
I was particularly desirous that the experiments should be made in a way which would be satisfactory to my friend, Dr. Formad, so that in case of a negative result the criticism might not be made that they were not properly done, and that a different mode of operating would have insured a different result. I accordingly invited Dr. Formad to assist in making the experiment, and he kindly came from Philadelphia, on a day appointed, for this purpose. Dr. Councilman, of Baltimore, was also present when the injections were made. The powdered glass used in the experiments was prepared by Dr. Formad, and the quantity of this, and of the marine blue, to be injected into each rabbit was determined by him. I was somewhat surprised at the considerable quantity of this material which Dr. Formad insisted upon using, for I had previously received the impression that in his experiments each particle served as a nucleus for a tubercle nodule, and consequently that but a small quantity of the finely

divided inorganic material would be required in order to obtain a sufficiently characteristic result. The amount used for each injection must have considerably exceeded a drachm, and I should judge came nearer two drachms, although, as it was not weighed, I cannot speak more definitely as to the exact quantity. It was a matter of astonishment to me that such an amount of irritating material could be introduced into the peritoneal cavity of a delicate animal like the rabbit without producing fatal peritonitis. The inflammation which did occur was of a conservative and chronic kind, as is shown by Dr. Councilman's post-mortem notes, and, with two or three exceptions, the animals continued in apparent good health up to the time when they were killed, and were then found to be in good condition, and in the case of young rabbits to have grown very considerably in size. I ascribe this to the fact that the material had been thoroughly sterilized by the method shortly to be detailed, and that, consequently, no septic complications occurred. Dr. Formad has informed me that in his own experiments about one-third of the animals operated upon died during the first week from septicæmia, and that a certain number of the survivors suffered an acute inflammation, attended with the formation of pus, and its subsequent discharge through an opening in the walls of the abdomen. It is evident that animals in this condition would be exposed to contract tuberculosis in an affected locality by inoculation through the open wound in the belly.

Dr. Formad's method, as described to me, consisted in first making an incision through the integument over the belly; in then plunging a trocar or canula into the cavity of the abdomen; and finally, in injecting the sterilized material through the canula with a syringe. The wound was then closed by one or more stitches. The dangers and possibilities of accidental infection attending this mode of operating were avoided in my experiments by adopting the following method, the special advantages of which were at once recognized by Dr. Formad.

The finely powdered glass, or ultramarine blue, suspended in water, was introduced into little glass flasks with a long neck, such as I constantly

Fig. 1.



use in my culture experiments, and one of which is represented in the figure in process of being filled with fluid from the glass beaker. The details relating to the manufacture and filling of these little flasks are given in my work on "Bacteria," from which the figure is taken. For this experiment the flasks were made rather larger than usual, their capacity being about a fluidounce. After filling them to about one-third their capacity, the extremity of each was hermetically sealed in the flame of an alcohol lamp. The contents were then

sterilized by placing them, for an hour or more, in a water-bath maintained at a boiling temperature.

The sterilized contents of one of these flasks were introduced directly into the abdominal cavity of each rabbit operated upon without any exposure to the external atmosphere or contact with other apparatus. This was accomplished as follows: The capillary extremity was first passed through the flame of a lamp to destroy any germs adhering to its external surface; the point was then broken off with sterilized forceps, and was thrust through the walls of the abdomen. By passing the tube beneath the skin for a short distance, and then directing it perpendicularly through the walls of the abdomen, a valvular opening is made, which prevents the admission of air or the escape of fluid when the tube is withdrawn. In operating by this method upon adult rabbits it is necessary to make a button-hole aperture through the skin with scissors, but the slender glass tube may be thrust through the thin skin of a young rabbit without difficulty. The contents of a flask were injected into the peritoneal cavity of each rabbit by the application of heat to its bulbous extremity by means of an alcohol lamp. The expansion of the inclosed air quickly forced out the fluid contents with the inorganic particles in suspension, and by this simple device all of the difficulties attending the use of an ordinary syringe were at once disposed of.

The experiment was made on the 17th of June; and on the morning of that day, before going to Dr. Councilman's home in the country, four rabbits were injected at the laboratory, two with ultramarine blue, and two with glass. In the afternoon eight of the fifteen rabbits in the country were injected, four with blue and four with glass, the remaining seven being kept as *témoins*.

The rabbits injected at the laboratory were intended to test the question whether association with tuberculous animals would make a difference in the result, and a few days later other rabbits injected with sputum, containing the tubercle bacillus, were placed in the adjoining compartment, which was only separated from that in which they were kept by a coarse wire screen.

One of the four rabbits operated upon at the laboratory was much emaciated, and evidently not in good health. This animal died the following day. Another of these rabbits died five days later, probably from injury to the intestine by the point of the glass tube. On the 15th of July another of these laboratory rabbits died, and, upon post-mortem examination by Dr. Councilman, the blue pigment was found in the cavity of the abdomen in great quantity, free or encapsuled, and also in the lymphatics of the diaphragm in such quantity as to give them the appearance of having been artificially injected. One rabbit injected with blue died in the country on the 26th of June, and one injected with glass on the 22d

of July. The post-mortem examinations were carefully made by Dr. Councilman.

The time fixed by Dr. Formad at the outset for terminating the experiment was two months, and at my invitation he again came to Baltimore on the 27th of August to assist at the post-mortem examination of the remaining rabbits, which I proposed to kill on that day. All of the rabbits from the country were brought to the laboratory in Baltimore on the morning of the appointed day, and two were killed and carefully examined by Drs. Formad and Councilman in my presence. One of them had been injected with the blue pigment and one with glass. Both were well nourished, and the injected material was in each case found in the cavity of the abdomen in great abundance, encapsuled in larger or smaller masses, and contained in the mesenteric glands, in the lymphatics, etc.

A more exact account of the distribution of this material, and of the pathological appearances which had resulted from its presence, will be found in Dr. Councilman's notes, which he has kindly given me for publication in connection with my own account of the experiment. As these rabbits presented no evidence whatever of tuberculosis, those still remaining were, at Dr. Formad's suggestion, kept for another month. But, at my request, another rabbit, which had been inoculated subcutaneously with tuberculous sputum ten days after the experiment with inorganic material, was killed and examined. This animal was found to have typical tuberculosis of the lungs, and the presence of Koch's bacillus was demonstrated by Ehrlich's method, by spreading upon thin glass covers material from a caseous axillary gland, and also from a crushed tubercle nodule from the lungs.

One month later the remaining rabbits injected on the 17th of June were killed and carefully examined by Dr. Councilman and myself. They were all well nourished, and none of them presented any evidence of tuberculosis, the lungs and liver being normal in appearance, with the exception that upon the surface of the liver of a rabbit injected with glass there were small fibrous nodules containing this material. In the mean time I had killed another rabbit inoculated with sputum on the 27th of June, and, as before, found it to have unmistakable tuberculosis of the lungs. A third rabbit inoculated with sputum at the same time was killed a few days later, and it also had transparent nodules scattered through the lungs in which the presence of the bacillus tuberculosis was demonstrated.

It is unnecessary to say that this experiment gives no support whatever to the claim that tuberculosis may be induced by injecting into the abdominal cavity of rabbits finely powdered inorganic particles, or to the view that the tubercle bacillus induces tuberculosis by acting simply as a mechanical irritant.

Indeed this view is directly opposed by a vast amount of negative evidence familiar to pathologists, but which has not heretofore received the attention to which it is entitled. It is well known that the lungs of healthy adults contain a great number of inorganic particles, which find their way to the air cells with the inspired air and become fixed in the tissues in such quantity as to cause a dark-colored, mottled appearance upon post-mortem section. These particles consist for the most part of minute angular fragments of some form of carbon, and from their size and angular form it would seem that they should be more potent as mechanical irritants than the minute tubercle bacillus. I am informed that in Europe the lungs of men who have been employed in certain glass or porcelain works are found to contain innumerable angular fragments of this kind of material.

Moreover we have a form of consumption of the lung which is not due to tuberculosis and which is directly traceable to the inhalation of inorganic particles in large quantity. This disease has received different names, depending upon the special occupation which is the cause of its development. Thus at Wheeling, W. Va., where it is of frequent occurrence among those employed in the large nail mills in that city, it has received the name of "nailor's consumption." It is recognized by pathologists as being at the outset an interstitial pneumonia, and in the end it corresponds with what is known as fibroid phthisis. Quite recently my friend Dr. Jas. E. Reeves, of Wheeling, has examined numerous specimens of sputum from several victims of this disease, with reference to the presence of the tubercle bacillus. In no case has he been able to find it, although he is quite skilful in preparing specimens showing the bacillus in material which contain it, as I can testify, having recently seen some very beautiful preparations which he has mounted.

Even were it the case that inorganic particles deposited in the lungs may give rise to nodules anatomically identical with those found in the infectious disease tuberculosis, it would be necessary to admit that these are only pseudo-tubercles unless it can be shown that they undergo caseous degeneration and give rise to an extension of the tuberculous disease by auto-infection.

DR. COUNCILMAN'S REPORT.—At Dr. Sternberg's request I undertook the examination of the rabbits injected with various inert substances in presence of Dr. Formad on the 17th of June last.

The pathological changes produced differed somewhat in those injected with blue from those where glass was used, the differences, however, in the individual cases of each were slight. Four rabbits were examined that had been injected with blue. One of these died June 26th. In this rabbit a quantity of serum slightly tinged with blood was found in the abdominal cavity, there was a slight fibrinous exudation with tender adhe-

sions of the viscera in a few places. The entire peritoneum was slightly reddened and the bloodvessels injected. There was no pus and no appearance of a purulent inflammation. The lungs and other viscera were healthy. Large quantities of the blue pigment were found, part of which was lying free in the cavity, part was enveloped in the fibrinous exudation or inclosed in the adhesions. The other three rabbits were killed later.

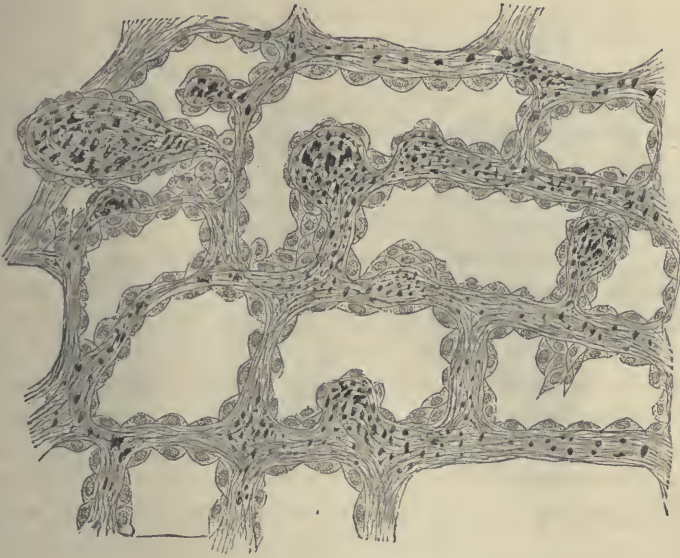
On opening the abdominal cavity the blue pigment was found pretty well distributed over the entire peritoneal surface. In the mesentery a few small blue nodules were found, and streaks of blue along the mesenteric vessels. Circumscribed blue nodules from the size of a pin's head up to that of a pea were also found at various places on the serous surface of the intestines, on the surface of the liver, and on the spleen. In one rabbit, on the posterior surface of the peritoneal cavity, there were numerous small villous-like projections intensely stained with blue, these were evidently similar to the papillary projections so often found on the human peritoneum. There were some adhesions between the various viscera, principally between the colon and cæcum, all of which adhesions were of an intensely blue color. The mesenteric glands were enlarged and injected with pigment, the lymphatics of the diaphragm were marked out in blue, and the lymph glands in the anterior mediastinum were also colored. A slight amount of blue was found beneath the skin at the point of injection. Lungs, liver, spleen, kidneys, and intestines healthy save for the common parasites so often found in the liver.

An examination of the blue nodules on the liver with a hand lens showed around each a whitish band of connective tissue. On sections of the nodules being made, stained in carmine and mounted in glycerine or balsam, they were seen to be composed of masses of pigment inclosed in well-formed connective tissue. The smaller nodules were simply encapsuled; in most of the larger there was not only a layer of connective tissue over the whole nodule but bands ran through the pigment dividing it into smaller masses. The adhesions were found to consist of dense connective tissue which inclosed in its fibres large quantities of pigment.

The two layers of the omentum were generally adherent; in some places, however, they could be easily separated. The membrane was stained in carmine and examined in glycerine. The microscopic appearances were extremely interesting, and showed very clearly the effect of continued irritation on a serous membrane (Fig. 2).

The endothelial cells, as seen on the edges of the trabeculæ, were slightly swollen and more granular than in the normal. At numerous places two or more layers of cells which often contained pigment granules were seen. At various places there were bud-like projections from the trabeculæ which contained large quantities of pigment, and were covered with endothelium. Every change could be seen from a mere thickening

Fig. 2.



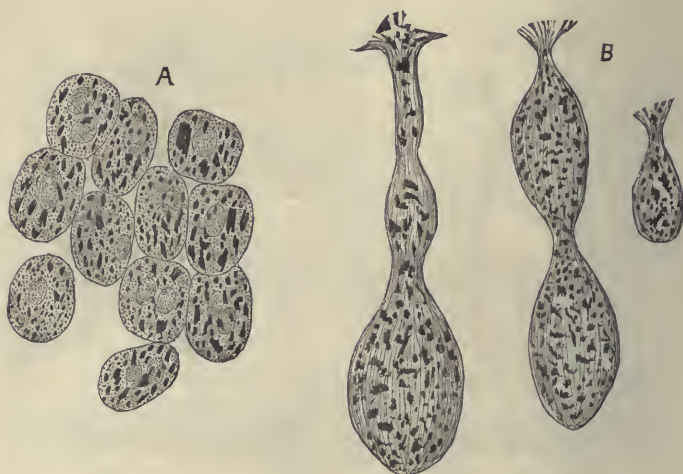
Omentum of rabbit after the injection of Berlin blue into the abdominal cavity.

of a trabeculum to a long process only connected by a narrow stalk. Pigment was irregularly distributed throughout the fibrous tissue of the trabeculæ.

An examination of the peritoneal surface elsewhere showed that the pigment was mostly distributed in the lymph spaces and lymphatics beneath the endothelium. Of its easy entrance into these vessels the injection of the various lymph glands gives abundant proof. The endothelial cells were generally free from pigment; only in a few places were found groups of large granular cells (Fig. 3 *A*) which contained it in large quantities. These cells evidently corresponded with the so-called germinating endothelium described by Klein and others. At numerous places all over the peritoneum, sometimes growing from the midst of a group of pigment-containing endothelial cells, were long villous-like formations of connective tissue (Fig. 3 *B*) with rounded ends. These contained abundant pigment, and most probably represented adhesions which had become elongated and finally broken by traction (Fig. 3).

In the rabbits that had been injected with glass the adhesions were more numerous and extensive than in the others. Numerous nodules of various sizes from the head of a pin up to that of a bean were found at various places. In one rabbit a large whitish mass was found at the point of injection as large as the end of the thumb. These masses were of a whitish color, and on section a soft mass could be squeezed out of them which could be rubbed between the fingers. An indistinct division

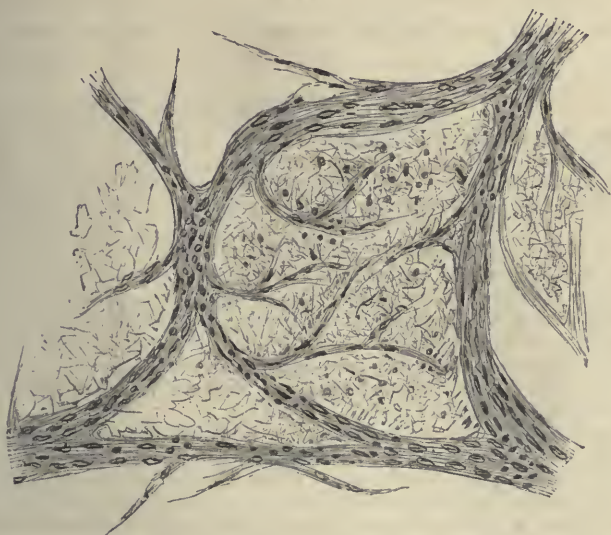
Fig. 3.



From same rabbit as Fig 2. *A*, germinating endothelium containing blue pigment. *B*, papillary connective tissue formations.

of the mass could be seen on the surface of the section. In the omentum and other places on the peritoneum small white points could also be seen. No lymph glands were enlarged. The larger nodules presented somewhat the appearance of conglomerate tubercles, and the substance squeezed out of them might, without even a superficial microscopic examination, be taken for a caseous mass. In like manner the small nodules in the omentum might have been taken for miliary tubercles but they were rather too transparent. Microscopic examination set all doubts at rest. The large nodules were composed of masses of glass inclosed in connective tissue. This not only inclosed the whole nodule but large bands of it penetrated between the glass dividing it up into small areas. From these larger bands smaller ones were again given off (Fig. 4). Between these bands nothing but minute fragments of glass and a few cells were found. The bands of connective tissue contained numerous bloodvessels. The smaller nodules were found where only a small amount of glass was present. Sometimes but a slight nuclear increase would be found around one or two bits of glass; at other times the glass would be inclosed in a small mass of connective tissue very rich in cells. At no place was any glass taken up by the tissue or found in the lymphatics—in striking contrast to what was found when the blue was used for injection. The adhesions were composed of newly-formed connective tissue rich in cells, and contained numerous small masses of glass inclosed in a capsule. There was also a good deal of the glass irregularly distributed in the connective tissue.

Fig. 4.



Section of nodule from the serous surface of intestine after the injection of powdered glass into the abdominal cavity.

There were many examinations made, both when the rabbits were killed and afterwards, of the nodules produced from the blue and the glass with regard to the presence of tubercle bacilli, but with, it is needless to say, negative results. The organs in which no changes were perceptible to the unaided eye were carefully examined microscopically, numerous sections of lungs, liver, spleen, and kidneys were made, but no pathological changes discovered. In no instance was any caseation found, and there were no nodules which had even the anatomical structure of tubercles—the so-called pseudo-tubercles.

Three rabbits were examined that had been injected with tubercular sputum. In two of these the most typical tuberculosis was produced. There was a large caseous mass at the point of injection, the axillary glands were caseous, and there were innumerable caseous nodules in the lungs, liver, and elsewhere. In one there was no caseation at the point of injection nor were the lymph glands affected. The lungs, however, contained innumerable grayish semi-transparent nodules, some single, others conglomerate. Examinations were made from all cases, and tubercle bacilli were found in every instance both in the nodules in internal organs, in the caseous mass at the point of injection, and in the caseous lymph glands.

POSTSCRIPT.—The following interesting letter from Dr. Reeves, relating to a form of consumption of the lung induced by mechanical irritation, but

which is evidently not tubercular, was not received until after the manuscript of the above paper had left my hands. I therefore append it as a postscript.

G. M. S.

WHEELING, W. VA., October 26, 1884.

DEAR DR. STERNBERG: I promised you at St. Louis week before last, that, as soon as possible after my return home, I would give you a brief statement of my observations concerning so-called "Nailers' Consumption," a disease which kills about 80 out of every 100 nailers in this community before they reach the age of 55 years.

In "The Wheeling Iron and Nail District" there are 10 iron and nail mills, employing in the aggregate not less than 7000 persons. Of these, 400 are nailers, each of whom has charge of two, three, or four machines, according to his experience and skill in making nails; and the greater part of his time while at work is occupied in grinding his bits or knives. While engaged in such work at the rapidly-revolving grindstones his hair, beard, and clothing soon become well powdered with the fine particles of sand and steel which float in his breathing space and choke his bronchial tubes.

Nine out of ten of these operatives suffer from hacking cough, accompanied with dark-colored expectoration, and dyspnoea, within the first year after they commence grinding; and the progression of the pulmonary symptoms is a gradual descent until the vital spark is extinguished. In other words, there is at first a bronchitis; next, a chronic interstitial pneumonia and induration of the lung tissue; next, softening and excavation, occasional hæmoptysis, muco-purulent expectoration, wasting of flesh, hectic, and night-sweats.

Several years ago I carefully examined 136 nailers, according to the scope of the printed schedule herewith inclosed, and out of that number found only one whom I regarded entirely free from pulmonary disease. In all of the others there was more or less dulness on percussion, bronchial breathing, increased vocal resonance, and conduction of the cardiac sounds.

The *post-mortem* appearances are quite uniform. The pigmentation of the usually contracted lungs is in proportion to the number of years the subject has spent in the mills. In some instances the lungs are as black as if they had been stained with ink.

The induration of lung tissue includes fibrous deposits, varying in size from small nodules to large masses, and, in resistance to the knife, resembles cartilage. In some instances such nodules or masses appear really gritty. The bronchi are dilated, and the bronchial glands are enlarged and hardened.

Pleural adhesions are very common. In one instance the pleural surface was studded with calcareous deposit in the form of very thin plates. Now and then a case will be met with where the lungs are also the seat of tuberculosis; but, in such instances, I doubt not, the family history, if questioned, will show tuberculous tendency.

During the last several months I have made frequent careful microscopic examinations of the sputa from subjects of "Nailers' Consumption," in search for *Koch's bacillus*, but thus far with negative result, notwithstanding the specimens examined represented the first, middle, and last stages of the disease—in one case even so late as a few days before the death of the patient. But, no doubt, I shall yet find the *tubercle bacillus* in the sputum from such a patient for the reason just mentioned, in describing the *post-mortem* appearances, namely, the lungs may also show tuberculous deposit.

A few weeks ago I picked up, from the sidewalk or pavement near my residence, a portion of a sputum that had been expelled by some passer-by, which furnished one of the best mounts I possess of *Koch's tubercle bacillus*. This fact points to a possibility needless here to mention.

Very truly yours,

JAMES E. REEVES.

ARTICLE II.

A CONTRIBUTION TO JACKSONIAN EPILEPSY AND THE SITUATION OF THE LEG CENTRE.¹ By WILLIAM OSLER, M.D., F.R.C.P. LOND., Professor of Clinical Medicine in the University of Pennsylvania.

THE case here recorded illustrates the following points : Epileptiform seizures from a very limited lesion ; the situation of the leg centre, and certain features in the clinical history of the disease.

The present doctrine of cerebral localization may be said to have had its origin in the study of the effects of very limited cortical lesions, and the labors of Fritsch, Hitzig, Ferrier, and others have removed the subject from the region of speculation to the solid ground of experimental science. Still, as far as man is concerned, while admitting the great and corroborative value of observations upon dogs and monkeys, the careful study of pathological cases offers the only means whereby positive knowledge can be attained. Year by year in the past decade evidence of this nature has been accumulating, and more important results may be expected as the records become more exact and scientific. Fully twenty years ago Dr. Hughlings-Jackson, studying cases of unilateral convulsions or spasmodic seizures limited to one member, found that they were often associated with localized spots of disease on the surface of the brain, and he suggested, in explanation of such cases, that the lesion was of the nature of an irritant to the cells of the gray-cortex, which discharged themselves, so to speak, in an irregular and explosive manner, causing a convulsion or spasmodic action of the muscles over which they normally presided. As the seizures began either in the arm, leg, or face, it was reasonable to conclude that the portion of the cortex affected was different in each instance,—*i. e.*, there were actually centres—motor in character—which when irritated in this way caused the convulsive attacks.

When experiments on animals demonstrated that the gray matter was irritable, and that stimulation of limited areas was followed by contraction of definite groups of muscles, Dr. Jackson's suggestion of motor centres was seen in its true light. Ferrier's observations on monkeys enabled him to indicate approximately the homologous motor centres in the human brain, and an extraordinary impetus was thereby given to the study of cerebral cases bearing upon localization. The result of the ten or twelve years' work enables us to speak with some degree of positiveness of the functions of certain regions of the brain. Thus the motor area has been ascertained to be in the mid-region embracing the convolutions on either side of the fissure of Rolando. Irritative lesions of these parts issue in convulsions more or less limited, destructive lesions cause paralysis, local or generalized

¹ Read before the Medico-Chirurgical Society of Montreal.

according to the extent of the disease. The other areas of the cortex cerebri are silent, *quoad* motor effects when stimulated, and when destroyed do not necessarily induce paralysis. With regard to further specializing of centres in the motor region, as far as man is concerned, the analysis of cases would appear to place the leg centre in the upper part of the central convolutions, particularly the part extending to the median surface—the paracentral lobule; the arm and hand centre in the mid-region of the central gyri, and the centres for the face and tongue at the lower end—a disposition in each instance coinciding more or less closely with the conclusions arrived at by Ferrier from his observations on monkeys.

Dividing cerebral symptoms into those accompanied with loss of function—negative, and those characterized by excess of function—positive, the cases of cortical epilepsy may be taken as examples of the latter group. In Dr. Jackson's phraseology, the proximate cause of the paroxysm is an abnormally highly unstable condition of the cells of the gray matter, resulting in a sudden discharge. "Healthy movement implies a liberation of energy or nervous discharge initially by cerebral cells, at any rate if the movement be a voluntary one. A convulsion, that is to say, a sudden, excessive, rapid, and temporary development of movements—many movements 'run up' into spasm implies of necessity a corresponding, sudden, etc., discharge." In a local spasm only a few cells are in this highly unstable condition; in severe seizures the sudden and excessive discharge of the highly unstable cells overcomes, it is supposed, the resistance of healthy cells in physiological connection with those highly unstable.

These preliminary remarks will enable the history of the case to be more satisfactorily followed, and I may state too, the main points of difference between these epileptiform seizures and true epilepsy; the slow onset, local in character, beginning in, or in mild attacks confined to, one limb or a single group of muscles; the gradual extension until the side is involved, or, in severe attacks the entire body; loss of consciousness late, not early and sudden as in true epilepsy, and lastly, the muscular contractions are clonic, rarely or never tonic.

On November 8, 1883, I received from Dr. — the brain of his daughter for examination, and with it the following history:—

E. L. M., aged 15 years 9 mo. When sixteen months old fell on her head from a table and appeared to be very much hurt, as she cried violently for a long time after. She appeared to be quite well for about five months, when the left hand was noticed to close firmly, and it seemed to pain her a little from the firmness of the contraction. This continued to increase in severity and frequency for three months, when the left leg became similarly affected, and in two months more she was confined to bed, and the paroxysms had become general all over the body, the mouth being generally fixed open during a spasm.

These spasms lasted in this violent form for about two months, she having as many as eight or ten in an hour. There never was at any

time any loss of consciousness. This makes about seven months altogether. Then suddenly the whole trouble ceased, and she was perfectly well and ran about as healthy a specimen of a child as could be seen.

She remained quite free from spasms for one year, when they returned in the same way, and ran much the same course for six or seven months, and then she recovered perfectly again for about the same length of time, and this went on till she was about eight years of age, or about six years after the first illness, when the left leg began to show signs of weakness and gradually the foot turned in, but she still ran about.

To give an idea of the kind of spasms she had about that time, I will describe one:—

Suppose her at the dinner table, she would suddenly say, "Oh, I am going to have a spasm." (She knew this by the contraction of the left hand.) She would then jump up and go to the sofa, get a cushion, lay it down on the floor, then lie down with her head on the pillow, and jerk away in a spasm for half a minute or a minute laughing or talking all through it, and never losing consciousness. She would then get up, replace the cushion, and come back to the table and finish her dinner.

After each interval, of many months, the seizures were more severe; and shortly after she attained her eleventh year, there was a return of the illness, which never ceased for nearly four years, and during six weeks of that time she lay unconscious, and had from fifty to eighty spasms during each twenty-four hours; but as soon as they became less frequent, she became perfectly conscious, and was able to sit up in bed or an invalid chair and read or do a little fancy work, although the left hand was very feeble, and the joints of the fingers would bend nearly as far backwards as they would forwards; this condition of the joints being the result of the position assumed by the fingers during the seizures.

Last Christmas, when she was nearly fifteen years of age, the spasms suddenly ceased, and she was for ten months without them, and during that time she became fat and rosy.

During all these years she was a remarkably intelligent child, and even very much above the average, for without any education of any consequence she was far beyond those of her age. Her memory was something remarkable.

There were no signs of disease on the body, excepting that the skin of the legs became very rough after the seizures commenced and disappeared after they ceased.

During the last two years the toes of first the right and then the left foot assumed a brownish-yellow appearance, which no amount of washing would remove, and latterly the skin became thickened, and small sections of this dirty brown epithelium peeled off and soon re-formed.

There was very little, if any, wasting of the limbs of the left side, but the foot was flexed inwards at a right angle to the leg, at last, and firmly flexed in that position.

Just a week before death, the spasms returned with great violence and increasing frequency, till they became almost continuous, and for two days there was complete unconsciousness or coma. Three hours before death the spasms ceased, and she died very quietly, as I suppose from congestion of the brain, as the conjunctiva were very much injected and the temperature very high. The post-mortem (so I was told) revealed a very much congested condition of the vessels of the brain.

Just a week before she died she told the nurse to be sure to tell me to

have a post-mortem, as she knew her case was a peculiar one, and that it might be of benefit to some one else, and to the medical profession in particular.

In reply to questions, the doctor supplied the following additional information: "The spasms always began in the left hand and *never* in the leg. For about two months at the beginning of the illness the hand just closed firmly for a few seconds, and there was no twitching, but after the expiration of the two months it always twitched from the onset of the spasm. Frequently she could be seen standing with the hand closed and jerking before the leg became affected, and she had to lie down. The spasms were never confined to the left leg. When the leg did become involved the twitching began in the toes and ran up the limb. At the first the arm alone was affected. When the spasms became unilateral, the face would twitch and the eyes roll to the convulsed side. The left arm though feeble was not *stiff*, and in the same useless state as the leg.

The clinical history may be summarized as follows: Jacksonian epilepsy lasting over fourteen years; the convulsions beginning in the left hand, at first monobrachial, then extending to the leg, afterwards becoming unilateral, and finally general, at first without loss of consciousness. For the first nine years of the illness, remarkable intermissions lasting for six or seven months, once an entire year. Six years after the onset the left leg got weak and stiff. For four years, the tenth, eleventh, twelfth, and thirteenth of the illness, the seizures frequent, during this period, six weeks' unconsciousness in which the spasms were very frequent, fifty to eighty in the day. Ten months prior to final attacks freedom from convulsions. Intellectual faculties unimpaired.

Brain examined on Nov. 9th; organ large and well formed; dura natural; hemispheres symmetrical; no special cloudiness of arachnoid; Pacchionian granulations small; large and small vessels of pia mater enlarged, and gave a very congested appearance to the surface; no adhesions of the membrane; no spots of opacity or thickening; the pia mater stripped off exposed natural looking convolutions of a deep pink-gray color; motor convolutions looked symmetrical, no puckering or depression; vessels at base healthy; right crus badly torn. The cord was cut just at junction with medulla, in the lateral aspect of which there is also a laceration; the organ was sliced after the Pitres method. *Pre-frontal* and *pediculo-frontal* sections normal. A section passing 3 centimetres in front of the fissure of Rolando shows nothing abnormal. In making the *frontal* section the knife met with increased resistance on the right side, and the section which passed through the ascending frontal convolution, exactly 2 cm. in front of the fissure of Rolando, exposed a firm fibrous mass occupying the upper part of this convolution in the superior fasciculus of white fibres. It measured 14 mm. in width by 15 mm. in vertical length, was 8 mm. from the surface towards the longitudinal fissure, 10 mm. from the top of the convolution at the margin of the long fissure, and 15 mm. from the external surface. It ran up to the gray matter, but did not appear to involve it except towards the median surface.

In a section 7 or 8 mm. behind the *frontal* the mass was still visible as a small round puckered area, situated just at the edge of the gray matter at the bottom of a sulcus passing into the asc. frontal from the fissure of Rolando, about 15 mm. from the longitudinal fissure. It extended to within 4 or 5 mm. of the fissure of Rolando. Thus the entire mass was within the upper end of the asc. frontal gyrus, having an antero-posterior extent of about 17 mm., and a vertical diameter of 15 or 16 mm., almost entirely within the white substance, but bordering on the gray matter at several places.

Unfortunately the torn state of the crus and medulla made it impossible to trace any descending sclerosis in these parts. Histologically the growth presented the characters of a firm glioma, consisting of 1st, and chiefly, a dense felt-work of fibres, in places coarse and devoid of cell elements; 2d, cells of various sizes, branched and fusiform, the processes of which could be directly traced in connection with the fibres. Towards the peripheral part of the growth the cells were more abundant; 3d, bloodvessels pretty numerous and large considering the amount of fibrous tissue in the mass. The growth shaded into the contiguous tissue in a very characteristic way, and towards the gray matter there was no sharply defined border, although in the microscopic sections it was easy to see where the normal tissue began, and there was a zone in which there were scattered a number of deeply stained small cells like leucocytes. In most of the sections the ganglion cells of the contiguous gray matter looked normal and their nuclei took the logwood dye as usual. On the side of the convolution towards the fissure of Rolando the growth directly involved the gray cortex. A study of the sections did not appear to bear out Klebs's view that the ganglion cells participate in the growth.

The case is unusual in the limitation of the lesion to one convolution and to its fasciculus of white matter, scarcely involving the gray substance which is commonly affected in cortical epilepsy. The accurate localization and the remarkable absence of tissue changes in the immediate vicinity give the case the nature of an exact physiological experiment. It is the rule almost for lesions causing epileptiform convulsions to involve the cortex, such as meningeal thickening and growths, exostoses, gliomas, and other tumors of the surface. They need not, however, directly affect the motor zone, but may be in the vicinity, near enough to excite irritation of the centres. Charcot lays down the following rule for guidance in this matter: When in the intervals of the attacks the patient has not any form of permanent paralysis, the disease causing the convulsions is in the non-motor zone, but when, on the contrary, the patient is paralyzed in the intervals, either monoplegic or paraplegic, we may conclude that there is a destructive lesion of the motor area, more or less limited. For example, a lesion at the base of the second frontal convolution might irritate the contiguous motor cells of the arm centre in the ascending frontal and produce epileptiform seizures without any permanent paralysis; or, if

in the central part of the motor convolutions, might produce irritative effects in the leg and face centres above and below it, while at the same time there was paralysis of the arm from destruction of its centre. In fact from cortical lesions in this region we may have the epileptiform seizures without the paralysis, or there may be paralysis with the seizures, or in some cases limited paralysis without convulsions. In the present instance there was, with a limited lesion of the motor area, permanent paralysis with contracture of one extremity and epileptiform convulsions.

In this class of seizures the spasms may begin in the hand, the face, or the foot, and, according to Jackson, this is the order of frequency, and, as a rule, the attacks begin always in the same place. They may be confined to the one region—monospasm, or may gradually extend until one half of the body is involved—hemispasm. Facial and brachial monospasm are more common than crural. The attacks may be limited at first to a group of muscles in an extremity, or to the entire limb. Thus, in the case of the patient with this disease, which I showed at the society some months ago, there was brachial monospasm, and in the one under consideration, the doctor states that the child might be seen standing while the arm was convulsed.

The order of spreading is important; it is usually up a limb, but it may be in the opposite direction, and in the event of the monospasm extending it is more common for the face to be involved with the arm, or *vice versa*, and the leg with the arm, than the leg with the face. Here from what can be gathered the order of march of the spasm was up the arm, then the leg became affected, and afterwards the face. This is unusual; it is more common for the leg to be affected last. Complete details, however, of the precise sequence of the spasms are wanting. Evidently at first there was brachial monospasm, then extension to the leg, and later hemispasm with rolling of the eyes and affection of the face muscles. Within six months from the origin of the trouble the seizures had become general, but the doctor says there was up to this time no loss of consciousness, such as subsequently took place.

The extension of the convulsions to the other side is explained in one of two ways; either through the direct pyramidal fasciculi with which each side of the brain is connected in a greater or less degree with the same side of the body, or more probably, on Broadbent's theory, that it is owing to "active conditions of the decussating fibres putting in action the associated nuclei of both sides of the cord, and then the bilaterally acting muscles of both sides of the body." The discharge of the nerve cells of the cortex cerebri excites the motor nuclei of the cord, and the violent impulses pass from the spiral ganglia to the muscles. Now it is easy to conceive that when the discharges are excessive and violent, the ganglia of the other side of the cord may be excited through the commissural fibres which unite the nerve cells of the anterior horns.

The long duration, fourteen years, of a glioma, is not without parallel. Dr. Jackson has recorded two cases, in one of which the fits lasted ten, and in the other twelve years. Cerebral gliomata are benign growths, which grow slowly and never produce metastases.

The other feature of interest in this case is the light it throws on the situation of the leg centre. Ferrier placed this in monkeys at the gyri at the upper end of the fissure of Rolando, and the result of pathological investigations in man point to the same situation. Cases of uncomplicated crural monospasm, or monoplegia are not common, but in the observations analyzed and collected by Ferrier and by Charcot and Pitres, the lesion was in each instance in the upper part of the central gyri, or in their extension on the median surface. When this part is simply irritated, there may be spasms beginning in, or limited to, the foot and leg; when the seat of a destructive lesion there is crural monoplegia. In their latest work,¹ MM. Charcot and Pitres bring forward additional evidence in support of this view. In the case here recorded, the fibrous mass was situated entirely within the anterior part of the paracental lobule, limited in extent, confined chiefly to the medullary fibres of the superior frontal fasciculus, and only touched the gray matter in places. A point to be referred to is the absence of the paralysis of the leg for the first six years—for if the convulsions and monoplegia were caused by the same lesion, how explain the late onset of the latter? From the fibroid state of the tumor, it might reasonably be inferred that it was originally larger, and had shrunk, but the absence of puckering on the surface, and the way in which the margins merged with the contiguous parts, make it probable that the growth was always small—so small, in fact, that at one period of its development it may have caused sufficient irritation to induce the convulsions, and yet at the same time not involved the special fasciculi of white fibres to the extent of producing weakness of the leg or monoplegia.

In the clinical history, the duration, fourteen years, is the most remarkable feature; it is rare for cases of cortical epilepsy to run such a prolonged course. The irregularity of the seizures, the long intervals and attacks of coma, which characterize so large a proportion of these cases, are phenomena not less difficult of explanation here where a lesion is present, than in cases of ordinary epilepsy in which coarse alterations are not usually met with.

¹ *Revue de Médecine*, Octobre, 1883.

ARTICLE III.

INTERMEDIATE HOSPITALS FOR THE TREATMENT OF ACUTE MENTAL DISEASES. By JOHN VAN BIBBER, M.D., of Baltimore.

THE nervous system has of late years claimed the attention and study of the best medical minds of all countries, and it is now an evidence of a still further progress in this direction, that mental diseases are no longer allowed to remain in the hands of asylum-superintendents, but are beginning to demand the care and investigation that they undoubtedly deserve from a larger and more active class of specialists. It is by the medium of this development that I have been led at various periods, during the past five years, to investigate the plan of treatment and the management of insane asylums, both in this country and in Europe. And everywhere, both at home and abroad, I have been impressed with the lonely and isolated position which mental diseases hold in the estimation of the general profession, and I may add, in the opinion of those who devote their lives to the care and treatment of insanity.

Indeed, it must seem strange to any one who will devote much thought to the subject; that acute mental trouble should be segregated like small-pox, or some dreadful contagion, far removed from most humanizing influences, and immured in more or less dreary, but always crowded asylums, where each patient, whether irritable, excited, or convalescent, is forced into the companionship with lunatics, and where both patients and physicians suffer the evil effects of a moral and social quarantine.

Now, although a man either of sound or unsound mind can endure the enervating and dispiriting effects of life under the blighting influence of a shadow, which makes humanity look hideous, and makes effort seem almost useless, yet it is a question whether the physician or patients are at their best in such an atmosphere, whether the one can progress and prosper in his science, or the other derive the best advantages from a delicate and careful treatment.

It is, in fact, a curious tradition, which is blindly accepted by most people, that insanity differs entirely from any other form of disease, that it must be removed from sight, and, if possible, from remembrance, and treated only by medical men who live within the walls of an asylum, and devote their lives to the care of this class of patients. No less is it a matter of general belief that the institutions in which this malady is treated are not hospitals but asylums, that their use and purpose, though known, is in some way mysterious, and their existence stands outside and apart from the ordinary ministrations of men.

This uncanny reputation is clearly the result of prejudice, and to some extent the result of the present system of treating and caring for a most unfortunate class of sufferers. It is the remnant of that feeling which,

years ago, built prisons for the safekeeping of lunatics, and which employed chains and manacles as the treatment for their disease. We have developed safely beyond that dark period, and, with rare exceptions, we have even passed the epoch of restraint.

But there are other changes which, in our present advancement, are as necessary and imperative to secure the better and more successful treatment of cases of acute insanity.

These changes must effect many of the characteristic arrangements of insane asylums, the medical officer in his double rôle of physician and superintendent, and the crowding of large asylums with acute and chronic cases. This reform must also bring about the establishment of intermediate hospitals for the treatment of acute cases of insanity, and the gradual development of large asylums into homes for incurable and chronic cases.

To discuss the clauses separately and somewhat in detail, let us commence with the duties of the medical superintendent of any insane asylum, and the position which such an institution should hold as a place devoted to the cure of diseases rather than the incarceration of lunatics. In other hospitals where patients are received, diseases treated, sufferings mitigated, and cures fortunately brought about, communication with the outside world is constant and beneficial. It comes through the medical officers, who call daily, fresh from the varied experience of life, from friends who are not frightened away by too stringent rules, though members of associations whose benevolent purpose is to make the dreary time of sickness less heavy and insupportable. But none of these healthy regulations exist in the management of the average insane asylum. The physicians are forced to live in the asylums, and, indeed, by many it is considered an absolute necessity for them to spend their lives and their energies in the management of these institutions. It is on this factor of management that I shall place the greatest emphasis, for I find it, in all my observations, the greatest enemy to the scientific and curative treatment of insanity. As the management of an institution interferes most materially and effectually with the higher and more necessary duties of the physician, this officer must be relieved of such an incubus before he can properly attend to the medical wants of his patient. Though it is claimed as necessary for the medical head of an asylum to live in the institution, and that his peculiar responsibilities require him to be always on the spot, I think this regulation is a decided mistake, and has been the cause of many of the most serious objections to the present system. It is a matter of daily observation that surgeons, who should have the most especial care and supervision over the cases they operate upon, do not live in the hospitals where they have their greatest responsibilities. After the most critical operations they leave the case in the hands of a competent assistant, and at the appointed time they return to their patients, again to leave them

after the proper observations. Physicians who attend the most acute diseases which require the closest scrutiny from hour to hour, find success and reputation outside the gloomy routine of hospitals, and if they secluded themselves in order to treat only cases coming within the four walls of an institution, I doubt if their skill or reputation would be as great as when developed by a more liberal and extended practice.

There is no reason, except the tyrannical demand of custom, which should prevent the medical officers of an insane asylum from availing themselves of all the advantages which the experience of private practice could give them. Yet they are not allowed to practise. They are forced to give all their time and energy to the management of the asylum. It is a narrow world to live in, and it is beyond human nature to expect that they should not become routinists in their practice, and fail to excite in their assistants that desire for investigation and research which forms the basis of all accurate scientific knowledge.

No class of men so thoroughly deserve the consideration of the public as the medical officers of an insane asylum. Their duties are onerous, and most of them of no professional interest. The superintendent of a large asylum does not long remain a doctor after he has assumed his duties. All his efforts to treat insanity soon dwindle into some administrative hobby, and the best intentions for the advancement of medical science become inevitably developed into ideas of economy and management. He is now a manager. The mainspring of every asylum is how much per day, how much per week? What is your appropriation?

By the present arrangement a man is so handicapped in his medical duties by the petty but necessary detail of his work as superintendent, that with the best intentions and the most sincere desire to do his whole duty, I doubt if he can accomplish much satisfactory work in the medical part of his office. With the crowded wards and the complex duties of a large asylum to claim his immediate attention, I doubt if any man can keep up his medical interest in insanity. Though the morning may bring new hope, and the evening brings him the satisfaction of duty done, though his energy and perseverance may follow closely upon his ambition, he has in this office Augean stables to clean out, and the stone of Sisyphus to roll up.

I have been taught in my observations of asylums that insanity is a disease not to be treated, but to be fed and managed; yet these are the schools in which we are to study, and this is the lesson that we learn. For in few medical schools is there any instruction on the diseases of the mind, and if there is any provision for such teaching, it is of the most elementary and superficial character. There is a very moderate amount of theoretical teaching on the subject of insanity, and the enormous mass of clinical material which is hidden behind the asylum walls is almost entirely overlooked by the medical staff of those institutions. The interesting and curable cases of insanity are often lost under the shadow of

the chronic patients, and from want of active treatment and attentive care they finally fall into the large percentage of this latter class. Under the present system of huge asylums and over-worked superintendents can we expect any other result than this? The question is, Can the system be changed? This is the theme of to-day. Shall we allow the most interesting problem of medicine to sink deeper into the rut of neglect, and suffer from the slavery of an injurious routine? Shall we permit the troubles of the mind to suffer the want of that medical attention which a fractured leg or a diseased liver can command in any hospital in the country? Shall we allow the hideous melancholy of insanity to languish beyond the reach of progress and advancement, secured behind the dull routine of asylum walls? No! The natural instincts of humanity, the ambition for medical progress, the desire to contend more successfully against the horrors of a dreadful malady, all these interests forbid that this dark spot on the civilization of the 19th century should be so pronounced and flagrant. We must investigate the reasons which have led to the stagnation in this branch of medicine, and afterwards endeavor to find out the best methods to contend against the evil influence of the past, and secure progress and advancement in the future.

In an isolated and disadvantageous position the subject of insanity has suffered the want of the active philanthropic interest which many of the miseries of mankind have developed. Thus the care of the insane has either devolved upon the local or state governments, or upon the guardianship of lay and non-medical trustees. Without any decided or influential medical interest in the organization and management of insane asylums, the equipment of these institutions has been neither progressive nor satisfactory, and as a result of such adverse circumstances, we find the huge asylums of the various States in a crowded condition, where patients are received in excessive numbers to be fed by wholesale, clothed by wholesale, and treated by wholesale. In this large and general distribution of treatment there must be many omissions and many errors, and though there are numerous other arguments against large and crowded asylums that should be considered, still the emphatic necessity for more careful treatment would be ample ground for a radical and decided change.

How this improvement is to be brought about is a question which is difficult to solve. Under the mistaken judgment of those who have had the supervision of insane patients in every portion of the country, this unfortunate class of our population has proved an expensive burden. The dominant idea which seems to have governed these officials in most cases, has been the desire for handsome and showy buildings. Hence these immense structures stand to-day, in their unwieldy costliness, a barrier to a more rational system of treating acute insanity. The medical officers are helpless. Nearly every year the American Association of Insane Asylum Superintendents protest against large institutions as opposed to

the best interests of the patients, but each year is uneventful in the development of any change in the vast crowding together of all classes of insane patients under one roof. It is clearly impossible that one man should be able to study the ailments of from 900 to 1200 patients, look after their physical wants, talk to their relations, and attend to the general management of the asylum.

According to the last annual report of the Commission in Lunacy, there were 78,584 certified insane patients in England and Wales. Of this number, how many are treated? If a certain percentage of this army of insane are curable, are they in a position to be properly treated? These vital questions cannot be accurately or even approximately answered, but the interrogation gives us some idea of the good to be accomplished by the improvement in the system and the facilities for treating curable cases of insanity. To bring about this improvement it will be necessary to change the character of the institutions devoted to the care of the insane; to transform them from asylums into hospitals; and it will be necessary to change the character of the medical officers charged with the important duty of treating insane patients, relieving them absolutely of all duties which conflict with their medical standing and progress.

But another influence is at work which will have a most stimulating and beneficial effect upon the definite progress of psychology. The division so long existing between insanity and general nervous diseases, is now about to be broken down, and the whole subject included under one head. The line dividing some general nervous troubles from actual insanity is very difficult to establish, and the treatment of the two classes of cases must inevitably come under the care of the same specialist. There is no reason, either on physiological or therapeutical grounds, why the neurologist should not include mental diseases in his study and practice, and the only factor which has prevented this natural division of the subject has been the peculiar organization of insane asylums. But it is now some time since the movement has commenced which will unite insanity to the duties of those specialists who attend only to diseases of the nervous system, and, if the effort which is being made to secure curative hospitals for acute insanity should succeed, the study of mental troubles will receive a great and decided impetus. In England and on the continent this tendency is looked upon as a most important progressive step, and I do not remember, in all my observations among neurologists or psychologists abroad, to have found one man who was opposed to its widening and healthy influence. In fact I have heard from a distinguished authority on insanity in England that he looked forward to the entrance of a new medical element into the field of mental troubles with the highest hope for improvement in asylums, and progress in the successful treatment of disease.

The large asylums and the combination of physician and superintend-

ent is not at all an American outgrowth. It exists elsewhere, and especially in England, where these two objectionable points have reached a high degree of unpopularity. *The Lancet* of August 23d has a leading article on "Our Monster County Lunatic Asylums," in which it refers to the fact that these institutions were becoming unwieldy, and "that in some cases 1500 or 2000 insane individuals, supposed to be patients, are congregated under what is practically one roof, and under the care and control of one medical man." This article goes on to say that if these monster institutions are intended solely for the care of the insane, of course there is nothing to say against them, but if, on the other hand, "they are intended as curative establishments, their constitution is a delusion and a snare." The same article refers to separation of the cure department from the care department of the insane, and says, "while for the latter object large institutions are not harmful, and may be necessary, the establishment of small lunatic hospitals is in many ways imperative for the former."

I find this editorial so in unison with my own ideas, that I must quote again even at the risk of repeating my own words. "It does not admit of question or dispute," says this authority, "that from the large amount of administrative work necessarily devolving on the medical head of one of these huge asylums, his medical functions are practically in abeyance. In saying this we give the explanation of the comparative stagnation of the special department of medicine under consideration, for whilst other branches of the art are advancing by leaps and bounds, psychological medicine, if not altogether stationary, manifests at best but a lame and halting progress.

In answer to this article I read in the next number of *The Lancet* a letter from the medical officer of a large county asylum in which he agrees most heartily with the opinions expressed, and adds his own condemnation of the present system. This voice comes from the active pursuit of a special work, from a position where difficulties and defects can be most keenly felt, and does great credit to the author, for many men occupying similar positions seem contented to accept the present situation without an effort for progress or reform.

It is not my purpose in this article to allude in detail to the omissions and abuses which prove, that, in the present method of asylum treatment, patients are neglected, and in many cases treated in a manner likely to prove injurious. I will, however, select one example from my observations. In one of the largest and best public asylums in London, I had the following experience during a morning visit to the patients with the physician and three assistants. We went into the yard where probably thirty men were trying to amuse themselves, and we were immediately surrounded by small groups of them, each having his complaint to make. There was no effort to hear each privately, as many could crowd around

the speaker as were so inclined. After several had recited their woes to this semi-medical and semi-insane audience, a fine-looking fellow came up and said he had a complaint to make against one of the patients who had stolen his tobacco-pouch. The accused promptly denied it, and accused his accuser of taking his scarf pin. During this heated conversation there was much anger shown on both sides, and a decided amount of unnecessary excitement. The doctor tried to calm and satisfy them, but they refused to be appeased. We went on to listen to the other patients in the yard, but before we left the inclosure, both the patients referred to above were in a very excitable and nervous condition. One was crying hysterically, and the other had forgotten his original trouble, and had entered into a dispute about the cause of his being placed in an asylum, about the insulting manner of the doctor to him, and all sorts of magnified and exaggerated ideas. Now it seems to me that it would have avoided this evident cause of excitement if the physician had seen these patients separately in his office; it would have been more dignified for him, it would have been less exciting for them, and he could have better allayed their passing excitement. Practising only in a hospital makes us forget the finer susceptibilities of our patients, and we are apt to forget that their feelings must, to some extent, be consulted. But it has for years been the custom of the hospitals to see patients in this manner, and it is not considered worth while to progress or change.

The plan of treatment would necessarily be much more detailed in small hospitals for acute mental diseases, than could be possible in an asylum where the number of patients is so large. The usual corridor or yard visit of the physician of an asylum is the familiar and casual incident of a good morning. This does not have the proper effect on the patients, nor is it the most dignified position for the physician, and I think it is in many respects to be criticized. If these patients are suffering from a disease, it deserves some treatment, and in order to treat it properly and in a thorough manner, it must be investigated and studied. The airing court is not the proper place for an official visit, and though many of the patients may be unable to recognize this fact, still the few who can observe its carelessness, will not fail to do it.

It could certainly do no harm, to be more particular to have the patients think that each day a proper interest was taken in their cases, and that they were under treatment, even if it was necessary to reduce its scope to the deception of a placebo.

After close observation and careful study, I have come to the conclusion that many of the evils to be complained of in our asylum system arise from the unwise association of the curable with chronic cases. This influence has an injurious effect in every department of the asylum, as will be shown by the following summary of conclusions:—

a. That the system of mingling curable and incurable cases of insanity

is a most injurious one to those patients whose condition demands the most tender consideration. Not only is this true from a medical point of view, but also from a moral and social aspect, for this combination precludes the proper treatment of curable cases, adds a heavy burden to the unfortunate patient, and renders him open in after years to the ignorant judgment of society.

b. That the mingling of curable and incurable insane is a most disastrous combination to the physician of the institution, for this system makes innumerable duties which wean him from the higher ambitions of his profession and drag him inevitably into a routine and unscientific practice. That the large percentage of chronic cases in all asylums leads the physician unconsciously into many errors concerning the management of the curable insane, and his duties are so heavy and onerous in regard to the fiscal and household management of his institution that the medical and most important part of his duties are necessarily neglected.

c. The mingling of curable and incurable insane has a most enervating and pernicious influence on the nurses and attendants of insane asylums, it blunts their efficiency for acute and important cases, and becoming too familiar with chronic patients, requiring little attention, they neglect and fail to do their duty to cases requiring the most scrupulous care and attentive nursing.

d. The mingling of curable and incurable insane produces an erroneous and injurious effect on the public at large, for it helps to foster the idea that insanity is a disgrace, that it is unlike other diseases, a something to be hidden away, and not to be spoken of or acknowledged.

In regard to the correctness of these conclusions there can be but little doubt, for having been placed in a position to take a broad and liberal view of the treatment of the insane, I am forced to say that there are few places either in this country or in Europe where an acute case of insanity is given the same advantages of treatment as are furnished to other diseases. This conclusion has been framed upon observation and experience, not of local acquisition, but strengthened by the knowledge of other countries and the opinions of their best men. If the proper treatment of insanity shows such a universal deficiency it must have a cause which is equally widespread, and this can be found in the system which has promoted large institutions, has allowed the pernicious crowding together of acute and chronic cases, and has developed the characteristic formation of the medical staff of the present asylum. If psychology is to advance, it must do it beyond the bad influences of these objectionable features, and this can only be accomplished by an entire change in the plan of treatment and administration of asylums.

It is thus that I have been led to consider the great good to be accomplished by the establishment of small hospitals for curable cases of insanity, in which the administrative cares would be assumed by an officer

appointed for that purpose, and where the medical head of the institution would have only his professional duties to occupy his time. This is the intermediate hospital which is to stand between acute insanity and the asylum. This is the hospital which is to develop the ambition of the specialist, which is to enlarge his horizon, and to bring him out of an asylum into the active world of thought and progress. This is the hospital which is to teach the treatment of insanity as it has not yet been taught, and to educate, under active clinical instruction, the men who are to be the guardians and promoters of a most important reform. The possibility of making a hospital and a school out of what has been heretofore an asylum without educational power, or without the means of using valuable clinical material is a proud future to look forward to. It means much to the profession. It is of deep significance to the public. It means an assurance that patients confided to the care of the intermediate hospital are to have every advantage of active treatment and good nursing. It means a course of treatment which will divert and distract the patients as much as possible from their sufferings, forcing them by activity to brood as little as possible over the dreary melancholy of their disease. It means the exclusion of every factor that can militate against the recovery of a patient, and the least possible detention after recovery.

The intermediate hospital organized to enter this new career, with a visiting physician whose sole duty will be to treat his patients, with a well qualified clinical staff, and equipped with all the necessary means of treatment, cannot fail to change very materially the low percentage of recovery from insanity. The details of the treatment of insanity more than any other disease are numerous and exacting. The subtle action of the brain must be reached by every possible means of assailing it, and hence the hygiene of the patient requires much care and intelligent supervision. For though drugs may play an important part in treatment, yet in many phases of mental trouble the physical forces need to be stimulated by every possible means, by bathing, rubbing, lotions, by walking, working, and generous diet.

It is difficult to draw the line between actual insanity, and some acute nervous disorders, and heretofore many cases have been consigned to an asylum for treatment which were entirely out of place in its associations or under its care. The middle ground will be covered by the proposed intermediate hospitals. Acute cases of insanity, and hybrid types of nervous disorder can be treated and cured without the unpleasant remembrance of an asylum, and without the injurious results which sometimes follow the injudicious incarceration of sensitive patients.

It was the fear of these bad effects of asylum treatment which led some specialists to inaugurate a movement against the methods and regulations now prevalent in insane asylums. The non-asylum treatment of the insane has in the past three years been warmly advocated by some

distinguished medical men, who have recognized the urgent need for more careful treatment than can be obtained in these institutions. The subject caused a disagreeable and protracted controversy which was practically without result, except to call attention to the fact that the whole system of insane asylums, as at present managed, was faulty and inefficient. If it is possible to inaugurate the plan of intermediate hospitals, the whole question will find its solution, for the scope and purpose of these establishments will be the treatment and cure of disease, and the agitation about incarceration and neglect, or the evil effects of crowded asylums can no longer find ground for existence.

The plan of intermediate hospitals need not interfere materially with the asylums which are already established. These institutions would gradually lose their claim to the care of acute cases, and become in time homes for incurables, idiots, and feeble-minded patients. But it must not be inferred, from what has been said, that there are not in England and on the continent some large institutions where only curable cases of insanity are received, and treated for a limited time. Yet these establishments are too large. They are crowded and they do not in their staff, or in their appointments, reach the standard suggested in the plan of intermediate hospitals. There is more of the asylum than the hospital about their management, and hence they at once oppose a barrier to the successful treatment of many cases.

In order to test the feeling of medical men who are known to be interested in the progress of insanity, and at the same time to ask their opinion on the subject of the proposed intermediate hospitals, I have prepared the following questions:—

a. Do you think the establishment of intermediate hospitals for acute mental diseases, viz., small hospitals organized as other curative hospitals are for active treatment, with resident and daily visiting physician, practical and likely to prove advantageous to the public and to the profession?

b. Do you think this system would tend to prevent the routine and careless practice so prevalent in institutions for the insane, or tend to rouse new interest and investigation in psychology?

c. Do you think that placing insanity on the same clinical footing as other diseases, treating it actively, having it nursed under the best possible conditions, avoiding the unlimited association of lunatics for the patients, and avoiding the unnecessary and onerous duties of fiscal management for the physician, do you think these changes would tend to improve the percentage of cures in mental diseases?

d. Do you think that the proposed hospitals, shorn of the mystery and usual characteristics of insane asylums, would tend to eradicate the popular idea of a social stigma being associated with insanity?

e. Do you think it would be practical to advise that a ward or department for insanity be established in large clinical hospitals connected with

medical schools, where acute insane patients might be received for a short time, and where the clinical instruction, so much needed in this branch of medicine might be given?

The unvarying answer to these questions has been affirmative, but as I do not wish to ask any one to share the responsibility of my opinions, I will simply say that these interrogations have been laid before some of the highest authorities on insanity in England and on the continent, and have received their most cordial approval. And why should they not? The feeling against the old method of treating the insane is widespread, and in every country where civilization has developed its intelligence the men who are in a position to know the want of progress in this branch of medicine, must be in sympathy with any movement in the interest of improvement.

In speaking to one of the highest authorities on insanity in England, one officially connected with the governmental supervision of the insane, I remarked that I was sorry to see so little interest shown by the medical officers of asylums in the treatment of their patients. I was forcibly struck by his answer, which was so uncomplimentary that I should prefer not to risk it in print. I said I supposed their time and attention were fully occupied by the duties of management of the asylums. "Yes," he said, "that is to a great extent the reason. In one of the best public asylums in England, the superintendent prides himself on the fact that he has so accurate a knowledge of all the details of the asylum, that if there is a discharge or a death in the institution, he will expect to see a diminution of four ounces of meat in the housekeeper's account." In pursuing the conversation further I found that my informant had some very decided ideas about a reform in English asylums. I was surprised to hear from him that the men who, in England, have the largest clinical experience and the greatest knowledge of insanity were not allowed to practise, but were confined to their duties in the country asylums. On the other hand, that the men who have private asylums, where at most there are two or three admissions during the year, where the service does not give any active clinical experience, that these physicians were the consulting authorities on insanity in London. "These gentlemen," said my informant, "decide on important cases in consultation, and as proprietors of private asylums, whatever may be their talent and knowledge, they are biased and influenced by their own interest. They are the keepers of boarding-houses, and they have an interest which is unprofessional. Their asylums are filled with chronic patients, and the practice is consequently a routine, in most cases, for the physicians and the patients. Public opinion is strongly against these private asylums, and since the Weldon trial has been decided against Dr. Semple, the feeling is increased." From what I could learn during this interview, I do not think the private asylums will recover from the prejudice which has been developed against them. And if this

be true, there will be another urgent reason why in England the system of intermediate hospitals should be inaugurated as soon as possible.

But in whatever country this progressive step finds favor, the low percentage of recovery from insanity, so universal and so discouraging, will undoubtedly be materially improved. The reason for the unfortunate result of treatment may be the combination of many adverse circumstances, but it is not to be entirely attributed to the fact that mental diseases are difficult to treat, or that they are in many cases incurable. This new organization will make an opportunity for both physicians and patients, and there can be but little doubt that the more successful treatment of insanity will follow its adoption. This result will open the eyes of the profession and the public, and will force a more considerate legislation in regard to our lunacy laws. Heretofore, these enactments have been based entirely upon the protection of society and the prevention of illegal detention in asylums. The time has now come when the interests of the patients should be considered, and the question of recovery regarded as of most paramount importance. The advancement of psychological science will demand increased facilities for the treatment of mental diseases, and the historian of the future will wonder how this vital aspect of the question was so long and seriously neglected.

It seems almost unnecessary to allude to the vast difference which exists between the legal requirements for the certification of an insane patient in England or on the continent, and the lax regulations about the same process in many parts of this country. That some wiser and more stringent laws will before long be enacted in the respective States upon this subject there can be no doubt, for experience has proved that insanity needs the fullest protection which the law can give, and up to this time the form of a certificate has been in many States nominal and unsatisfactory.

Notwithstanding all the control which the government assumes over insanity in England, we find in the daily press during the past summer the most violent articles on the tyranny and incompetence of asylum physicians, and a general assault on the whole question of insanity in regard to its management and treatment. The Welden case brought the matter into prominence, and after the verdict against Dr. Semple the public press was not very charitable in its criticism and remarks. As an example of these criticisms, I find the following paragraph in a July number of the *London Truth*.

"I would suggest to the Commissioners of Lunacy that an inquiry be made into the mental condition of the 44 persons who have been put in the asylum of Dr. Forbes Winslow on Dr. Semple's certificate, for it is fully clear that this practitioner entertains views concerning insanity which would lead to the confinement of a good many of us."

If the certification of insanity in England can be criticized, and the protection against illegal confinement in asylums so decidedly doubted,

I confess I feel some curiosity to know what these critics would think of the protection which the law offers to lunatics in nearly every part of the United States. It would be clearly impossible to give more than a hasty glance at this side of the subject, for every State has a different form of procedure. For an example of this easy method of certification, it will be only necessary to look at the superficial way in which insane patients are committed to the care of insane asylums, in the State of Maryland. I copy the form used.

Medical certificate date.

We, the undersigned, Practising Physicians of _____, do hereby certify that _____ is insane and should be placed in a hospital for the insane.

_____ M.D.

_____ M.D.

This is simplicity itself. There is no specification of delusions or of tendency of insanity, or of peculiar form of mental trouble. Under the broad and general term of insanity, covering like charity, a multitude of commission and omission, the unfortunate patient is turned into a large society of lunatics, all of whom have entered into that dreary abode by the same broad and liberal avenue.

Now whatever may be the defects of the system of caring for the insane in England or on the continent, we must acknowledge that the entrance into an asylum in those countries is made narrow and hard. In England it is necessary to have the separate certificate of two physicians, who must examine the patients separately and write separate certificates stating: 1st. Qualifications entitling the person certifying to practise as a physician. 2d. Facts indicating insanity as observed by the examiner. 3d. Facts indicating insanity communicated by others. This is further strengthened by statement of relative or guardian answering seventeen questions. These certificates are required to be sent by the superintendent of the asylum, together with his official notice of the reception of the patient to the commissioners in lunacy within "one clear day" of the patient's admission; and yet the public are not satisfied that patients alleged to be insane are fully and satisfactorily protected.

In order to guard against unjust and illegal detentions in insane asylums, the government of each State should make stringent laws, and surround the admission of a patient into an asylum with as many safeguards as possible. Yet there should be ample and easy provisions made for immediate and undelayed treatment of mental cases, just as there is accommodation provided for other acute cases of disease. This want would be provided for in the plan of intermediate hospitals, where the patients could be received without legal certification for a limited number of days, and where, being under the treatment of a visiting physician and being

free from the circumstance and unpleasant surroundings of a large insane asylum, being, in fact, in a hospital for treatment rather than detention, the patient could suffer no wrong while the proper papers were obtained and formalities gone through with. The wisest legislation would be to make the admission into an intermediate hospital the first and necessary step to the asylum, and require that one certificate should be signed by the physician of that institution, who from his position and experience would be the highest authority on the subject.

The plan proposed would be as follows: That though it is essential for patients suffering from mental diseases to be protected fully by exacting legal formalities, yet it is not wise that these necessary steps should interfere with proper and immediate treatment; hence, it should be made possible to admit a patient to an intermediate hospital without certification, under the condition that the legal requirements be carried out within a certain number of days; and if the patient at the end of a specified time prove to be a chronic or incurable case, that he should be removed to an asylum, but only upon the additional detailed certification of two physicians, one of whom should be the chief medical officer of the hospital. This arrangement would be the best possible means of allaying any fear of illegal detention in an asylum, for the hospital would be after a fashion, a clearing house, where the patients entering the asylum would undergo a searching inspection and examination.

These are the general outlines of a system which I am confident must in time take the place of the present imperfect and injurious arrangements for the treatment of acute insanity. In a subsequent article I will enumerate the details of my observations in this country and in Europe, but for the present it is enough to show the want which has existed so long and the necessity which is so imperative, and to suggest the means to supply the one and successfully carry out the other. It will not require much proof to make good the assertions made, or to convert any one but a violent partisan from the imperfect system now in use, to the adoption of some plan for the amelioration of the present method of asylum treatment. A knowledge of insanity certainly precludes the idea of adhering to the injurious crowding of asylums and the consequent meagre and unsatisfactory medical treatment. Self-interest, however, is very blinding, and it may in some cases lead the narrow-minded to overlook the broad and scientific side of this question, and see it only in its selfish or smaller aspect. The fact of being insane has heretofore been considered a crime against one's family and society, for the penalty for such a misfortune has in most cases been imprisonment for an indefinite period, the duration of which has been up to this time dependent on many extraneous circumstances. But in the system of intermediate hospitals, a remedy for these evils is suggested, which will not only give every possible assurance of cure, and the shortest duration of detention, but will also tend to reverse the judg-

ment of the public and give insanity its proper position as a disease. If there were no other reason than to protect the patients from the finger of reproach or criticism in after years, this system would have an ample argument for its existence, but this is the weakest of the social reasons in favor of it, while the medical necessity for a more scientific method of treating these patients is of an urgency that no partisan can deny.

A question which has at stake the restoring of the wonderful attributes of the brain to those unfortunate beings who have lost their minds, is one which must interest both king and peasant, both the highest in social life and the humblest laborer in the land. Still more must it be of vital interest to those who by their studies learn to appreciate fully the helplessness of this disease, who by experience have found out how sadly its treatment has been neglected, and who, from the prospect of a new system, look forward with hope and ambition to the progress of the future.

ARTICLE IV.

AN OBSCURE CASE OF POPLITEAL ANEURISM WHICH SIMULATED SARCOMA.

By FRANCIS J. SHEPHERD, M.D., C.M., Professor of Anatomy McGill University; Surgeon to the Montreal General Hospital.¹

W. H., aged 46, carpenter, entered the Montreal General Hospital Dec. 31, 1883, suffering from a large ulcer of the right leg, and a tumor of the lower and back part of the right thigh. Previous to 1875, his health had been always good, no history of syphilis or rheumatism, but has had frequent attacks of gonorrhœa. Has been intemperate since boyhood. For three years was a soldier in the British army. In the autumn of 1875, was treated in the Montreal General Hospital for double popliteal aneurism.² The aneurism of the left popliteal was treated by digital compression, and that of the right by Carte's compressors. After remaining in hospital two months, he was discharged cured. He says that he kept well for two years, then the small hard lump which had remained in his right popliteal space began to enlarge and pulsate, and was again cured by compression. For the next four or five years he was not troubled with his aneurisms, but about a year and a half ago noticed a small tumor in the right popliteal space; this tumor was hard, firm, and did not pulsate; it gradually increased in size, and when he was in hospital a year ago for treatment of the ulcer on his right leg it was noted as being about the size of a man's fist, fixed, hard, and without pulsation. From this time the tumor increased more rapidly.

The following is the surgical reporter's account of his condition on entrance: "On examining the affected leg a huge indolent ulcer is seen on the lower and outer side; there is also a large tumor, nearly the size

¹ Read before the Canada Medical Association, Aug. 1884.

² An account of his case is published in the Canada Med. and Surg. Journ., vol. i. p. 298.

of a man's head, on the back of the thigh; it extends from the popliteal space to the middle of the ham, and is somewhat egg-shaped. The measurement of the thigh a little above the knee, the point where the circumference is greatest, is twenty-three and a half inches. The left limb at the same point measures twelve and a half inches. The tumor is immovable, smooth, and inelastic; it gives on palpation no sense of fluctuation, neither is there any pulsation in it, nor is any thrill felt or bruit heard. Pressure on the artery above does not influence the tumor. It is not tender, and there has never been any pain, either in the leg or the tumor, except after long standing; in fact, the patient thinks very little about the tumor, and comes into hospital for the purpose of having the ulcer in his leg treated. The leg, owing to the size of the tumor and the stretching of the tissues over it, cannot be straightened perfectly or flexed completely; he lies with it in a semiflexed position. Coursing over the tumor are numbers of enlarged veins. The leg is not swollen or œdematous. The glands in the groin are enlarged, and can be felt extending under Poupart's ligament into the abdomen."

Not feeling sure as to the diagnosis, and hesitating from the history to pronounce it a sarcoma, I decided to watch the case for some time before undertaking operative procedures.

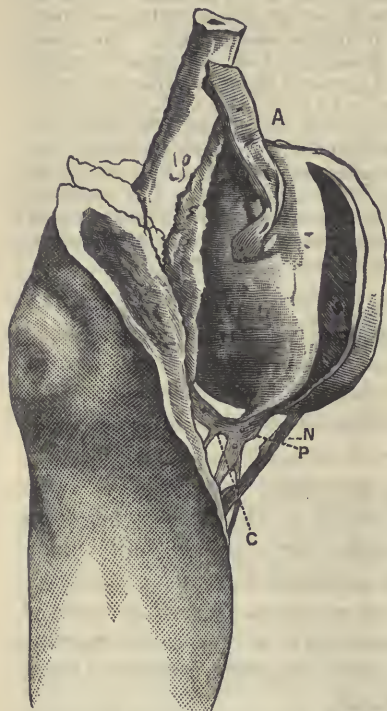
After the patient had been under observation some three weeks, he complained of severe pain in the tumor and down the back of the leg, and it was found that the measurement at the point of greatest circumference had reached twenty-four and a half inches. He now began to develop febrile symptoms, and for several weeks his temperature was a couple of degrees above normal, his tongue was coated with a white fur, and there was some tenderness on the right iliac fossa. When he recovered from this slight fever, which lasted about three weeks, and which I in no way connected with the tumor of the leg, a consultation of my colleagues was called. The tumor had all this time been slowly increasing in size, the man could now only very slightly either flex or extend his leg, and he suffered severely from pain.

Although fully alive to the possibility of the case being one of aneurism, still, from the total absence of aneurismal symptoms, and after repeated and careful stethoscopic and manual examinations, I was becoming, from week to week, more convinced that the evidence pointed to sarcoma, either of the periosteum or the parts about the old aneurism. My colleagues agreed with me in this conviction, and amputation was decided on.

The man having readily consented, amputation was performed on February 24, 1884, at the junction of the upper with the middle third of the thigh and well above the tumor. The circular method was employed, and the stump was dressed with iodoform, gauze, and borated cotton. The wound healed rapidly, and at the end of two weeks, with two dressings, was all united by first intention, except where the drainage tubes had been.

Examination of the Tumor.—On cutting into the tumor it had to the naked eye all the appearances of a neoplasm, but on examining it microscopically it turned out to be composed simply of fibrin. The fibrin was not deposited in layers as is commonly the case, but solidified "en masse," so to speak. There was no cavity in the tumor, but it was solid throughout. The femoral artery ended above the tumor in a blind sac

(see A in accompanying Fig.). Upon slitting up the popliteal artery, at the lower end of the tumor, the external coat of this vessel was found continuous with the capsule of the tumor, and here no doubt was the orifice of the aneurism; about this point the clot was in a softer condition than in other parts of the mass. The sciatic nerve was tightly stretched over the tumor and considerably flattened. Large collateral branches joined the popliteal artery near where it was connected with the tumor (see accompanying Fig.).



A. Femoral artery ending above the tumor. P. Popliteal artery continuous with the sac of the tumor. C. Large collateral branch. N. Sciatic nerve.

The diagnosis of popliteal aneurism is not generally a matter of great difficulty, still some of the cases of aneurism simulate other diseases so closely that mistakes are occasionally made. Many able surgeons have opened aneurisms supposing them to be abscesses,¹ and others again have tied the femoral artery for malignant growths, mistaking them for aneurisms. There are not a few cases recorded where an old consolidated aneurism has been mistaken for a sarcomatous tumor. Dr. Henry B. Sands reported such a case to the New York Pathological Society (*Med-*

ical Record, vol. xxv., 1877, p. 188), where amputation was performed for supposed sarcoma of the ham, and which turned out to be a consolidated aneurism. The case is as follows:—

“A man aged 46 entered the Roosevelt Hospital, suffering from a tumor of the right leg. He had been the round of other hospitals, and the opinion arrived at was that the patient suffered from a sarcomatous tumor. Treatment by compression had been practised fourteen years previously, for supposed popliteal aneurism. This was continued for nine weeks, and subsequently another tumor developed below the site of the original one. This increased from year to year, by an annual increment of an inch and a half in the circumference of the limb. Ten days before admission to the Roosevelt Hospital he was seized with a rigor, and, on entering, a painful tumor on the leg was noticed, which extended down from the popliteal region. A careful examination was deferred for four days, on account of the depressed state of the patient. It was then found that the tumor was situated on the posterior and upper two-thirds of the leg. The measure-

¹ See Dr. S. Smith's “Diagnosis of Abscess from Aneurism,” *AMER. JOURN. MED. SCI.*, April, 1873.

ments were as follows: Five inches above the ankle the circumference was five inches, six and a half inches above the ankle, the girth was nineteen inches; at the upper third of the leg the measurement was twenty-three and a half inches. The size diminished gradually in the upward direction. The tumor was firm, smooth, and nodulated. That portion of the tumor which was at the lower part of the thigh was found to give evidence of fluctuation and pulsation; there was also a bruit heard with a stethoscope. On December 18th, the mass broke in two places, and discharged a large amount of grumous blood together with solid masses of bloodclots. Following this, there was a subsidence of fluctuation and pulsation. Amputation of the thigh was performed, and thirteen days after the patient died. At the autopsy it was found that the tumor was an aneurism. At its upper part there was a solid mass which was at first thought to be a neoplasm, but, on more thorough examination, proved to be a blood-clot. The popliteal artery above the sac was obliterated, and it was a mystery how pulsation could be accounted for without communication being made out with arterial branches, and, moreover, without the mass being superimposed on the artery."

The description of the appearances of the tumor is not very full; no doubt it was fed, as in my case, by anastomotic branches, which joined the popliteal immediately below the tumor. The existence of pulsation and a bruit, with fluctuation, made the case more like an ordinary aneurism than my own. Its points of resemblance are the consolidated tumor which increased in size the former cure of the aneurism by compression, and the obliteration of the artery above the tumor.

Mr. Erichsen (*System of Surgery*, vol. ii. p. 22, ed. 1869) figures a somewhat similar case which was mistaken for a painful solid tumor. The leg was amputated, and the tumor proved on dissection to be a consolidated aneurism pressing on the popliteal nerve. From the plate of the aneurism which is given, there appears to be a large cavity near the surface of the tumor which contained a recent coagulum, and which must, during life, have been filled with fluid blood.

Mr. Holmes, in his article on aneurism (*Holmes's System of Surgery*, vol. iii. p. 43, ed. 1883), says:—

"I can refer to at least three cases, one a preparation in the St. George's Hospital Museum, another in the Museum of the Royal College of Surgeons, and a third in private, in which the limb was amputated for a large tumor in the popliteal space, believed to be malignant, and which turned out to be cured aneurism, and I know that this has occurred in several other instances. In some of the cases, however, the pressure of the tumor had produced gangrene, so the operation was necessary."

Mr. Prescott Hewitt (*Medico-Chirurg. Trans.*, vol. xxix. p. 75) relates an interesting case of aneurism of the femoral artery, which was cured by ligature of the external iliac, and where, after all pulsation and sound had ceased in it, the tumor gradually increased till it reached the size of the head of a full-grown fœtus, and was thought by many of the surgeons to be a tumor of a malignant character. The man died of phthisis, and the *post-mortem* examination revealed a consolidated aneurism and obliteration of the femoral above the tumor.

Mr. Marrant Baker, in an article on "Aneurisms which do not Pulsate" (*St. Bartholomew's Hospital Rep.*, vol. xv. p. 79), mentions three cases

where the leg was amputated for supposed malignant tumors, which turned out to be consolidated popliteal aneurisms. Two of these cases were referred to Mr. Maunder at a discussion of the Clinical Society (*Lancet*, March 16, 1878).

Dr. Dunning (*Medical Record*, August 5, 1876) reports a case of popliteal aneurism mistaken for semi-malignant growth, in which the surgeon attempted to remove the tumor, the case terminating fatally from hemorrhage a few hours after the operation. In this case the tumor was hard, inelastic, having no pulsation or bruit, and was slowly increasing in size. The tumor, as examined after removal, was found filled with concentric layers of fibrin occupying its entire space, save a small cavity in the course of the artery.

Mr. Oliver Pemberton (*Lancet*, vol. ii. p. 120, 1877) reports a case of femoral aneurism, for the cure of which he tied the external iliac. The tumor disappeared, and for two and a half years the man remained perfectly well, when suddenly he found the seat of the aneurism enlarging to the size of a man's fist. It continued to grow slowly till, when the case was reported, it measured five inches in length and breadth; and three in depth. It was free from pulsation and pain. He looked upon the case "as an instance of the production within the walls of an apparently cured aneurism of deposits of fibrin, continually increasing in amount, always feeling solid, and never giving rise to pulsation or sound." He mentions, shortly, two other somewhat similar cases.

These cases which I have quoted will give some idea how difficult may be the diagnosis between a consolidated aneurism and a sarcomatous tumor. Pirogoff says:¹—

"If I were asked what signs I hold most decisive of the existence of an aneurism which does not pulsate, I must confess that, if there is no bruit to be heard at any part of the tumor, I know of no other than these two: (1), collapse of the swelling, sometimes only to a slight extent, when the main artery is compressed between the heart and the tumor; and (2), if the pulsation of the artery can be felt upon the surface of the tumor, an unnatural extension of its impulse, for example, over twice the usual breadth of the vessel. But, in order to satisfy myself of these two phenomena, it is, of course, necessary to examine the case repeatedly, and with the greatest attention. The diagnosis must not be founded on a single examination."

Barwell (*International Encyclopædia of Surgery*, vol. iii. p. 398) "does not know of any positive signs by which to distinguish between a solidified aneurism and other hard tumors." He says, "the great aid to diagnosis will be the more or less globular form of the tumor, its isolation from adjoining structures, and the fact that it does not increase (if really solid) but rather decreases." Now in my case all the signs by which a diagnosis is usually made were wanting, there was no fluctuation, pulsation, bruit, or increased arterial impulse, and the tumor steadily increased

¹ Klin. Chir., quoted by Holmes, St. George's Hosp. Rep., vol. vii. 1874.

in size. The history of the case certainly pointed to aneurism, but the clinical signs did not; in fact, there was not a single symptom which pointed to aneurism, so that an accurate diagnosis was, in my opinion, impossible. Had a diagnosis of consolidated aneurism been made out, could any other means besides amputation have been adopted for relief? I think not. Ligature of the superficial femoral above the tumor would not have availed, owing to the obliteration of that vessel. Compression of the common femoral on the pubis would have been equally useless, as cutting off the blood from this source had been practised before, and the circulation was carried on, probably, by branches of the internal iliac artery anastomosing with the perforating arteries of the profunda and articular branches of the popliteal. Removal of an aneurismal tumor by dissection has recently been successfully practised by Mr. Wm. Rose, Surgeon to King's College Hospital, London. In this case the aneurism was a femoral one, and Mr. Rose had failed to cure it by digital compression, ligature of the external iliac, or rest and iodide of potassium, so he determined to dissect out the tumor, tying all the communicating vessels as he met with them. The aneurism being a small one, only the size of a lemon, the operation was successfully performed, hemorrhage being prevented by Esmarch's bandage and Davy's lever (*Lancet*, Dec. 22, 1883). In my case this method of treatment would have offered little chance of success, owing to the immense size of the tumor and the already badly nourished condition of the limb, as evidenced by the large indolent ulcer of the leg. So, had the nature of the tumor been certainly diagnosed, it seems to me that amputation would have been the most suitable, and probably the only means, by which the patient could have been relieved from his sufferings and cured of his disease.

There are several interesting and important points connected with the tumor itself. The fibrin was not arranged in layers but was simply one uniform mass,¹ and, to the naked eye, looked exactly like a new growth. The orifice of the aneurism was at the distal end of the tumor, and the blood therefore flowed from below up, with, of course, a lessened stream; the circulation owing to the obliteration of the femoral above the tumor being carried on by collateral branches. As there was no cavity in the tumor the absence of pulsation and bruit is explained. It is, however, difficult to understand in what manner the tumor increased in size, and how the new fibrin was deposited; probably the mass was in a spongy condition so that the blood could easily permeate it, and thus fibrin could be slowly deposited.

¹ Mr. Wagstaffe (*Path. Soc. Trans.*, vol. xxix. p. 73), reports a case of popliteal aneurism cured by Esmarch's bandage, in which, after death, he found the clot contained within it solidified throughout and well organized.

ARTICLE V.

DOUBLE INFANTILE SPASTIC HEMIPLEGIA,¹ WITH THE REPORT OF A CASE.

By SARAH J. McNUTT, M.D., Lecturer on Children's Diseases in the New York Post-Graduate Medical College, and Instructor in Gynecology in the Woman's Medical College of the New York Infirmary, etc.

ELSIE M. died of pneumonia, in this city, November 12, 1883, at the age of two-and-one-half years. She was of German parentage, and born in Dresden. The mother, previous to her marriage, was healthy. Since then she had been poorly nourished and overworked; the father had a chronic bronchial trouble, yet no distinctly tubercular or specific family history could be made out on either side. Elsie was the sixth child. The first child was born dead on account of a "strain," which was followed by flooding. It was born by the breach. The second was apparently well-developed, but died in convulsions the twelfth day after birth. The third was a girl, who is still living; she is nine years of age, but delicate, with a box-shaped head and enlargement of the epiphyse of the long bones. The fourth was miscarried at the end of six months, without known cause. The fifth lived only four years; it had always coughed, and died after an attack of measles. During her sixth pregnancy the mother was especially miserable, particularly during the latter half. She had frequent attacks of fainting. She attributes this ill-health to a tapeworm, of which she passed large quantities during the time. The delivery of the child was attempted by a midwife, but it presented by the feet, and several doctors were called in, chloroform was administered, and the head delivered instrumentally. The mother was afterward told that the labor was so difficult and delayed that the doctors finally despaired of saving the life of the child, and went to work with great energy in order to save her own. The child had convulsions during the first nine days of its life, with but short intermissions. Deglutition was from the first difficult, and the breathing always was noisy. The child was never able to take solid food. It could cry readily, but it never made any sound as if trying to speak. For a long time it did not appear to have any muscular power, but, for a few months preceding its death, it was able to raise its head, and to hold things in its hands; its grasp was, however, uncertain.

Elsie was presented at the children's clinic of the Post-Graduate Medical School, June 15, 1883. I therefore had her under observation during five months. Upon her first presentation at the clinic my attention was attracted by her loud and stridulous respiration, and I started toward her, supposing that operative interference was immediately required. The child was not cyanosed, however, and the mother told me that the breathing was now less labored than it had formerly been, and that she was only anxious to have something done to induce her to walk and to talk.

The child was small and emaciated, the skin wrinkled; there was very little subcutaneous fat, and the muscles and bloodvessels were distinctly visible under the integument. The head was asymmetrical, the bi-temporal being the longest diameter, whilst the right temporal region was the most prominent. The child resisted examination, screaming and kicking vigorously, and striking out when the extremities were handled. The cry was hoarse, and when the child was annoyed the respiration was particu-

¹ Thesis presented for membership in the American Neurological Association.

larly labored. The respiration was of the forced, costal type; the inspiration prolonged, high-pitched and noisy, and the expiration comparatively easy. The superficial veins of the neck were distended and tortuous. The thorax was flattened antero-posteriorly and widened laterally. The percussion resonance was good, the respiratory murmur low-pitched, and air entered freely into the lungs. There was paresis of all of the extremities, with some muscular rigidity. In the lower extremities both the paresis and the rigidity were more marked. The legs were crossed. There was no nutritive disturbance of the skin, and the functions of the bladder and rectum were normal. As the mother fed the child she seized the bottle eagerly, and drank rapidly for a few seconds, to be then interrupted by the regurgitation of a portion of the milk through the nose, accompanied by choking and struggling for breath. Having recovered, she would return to the bottle only to have the same distressing symptoms again appear. The mother said that she was then feeding better than formerly, when swallowing was almost impossible. A traumatic or hemorrhagic injury at the base of the brain was suggested to me by the association of the paralysis with this dysphagia; and the dyspnoea, together with the feet presentation, the traction, and the circulatory interference implied by the prolonged labor and the instrumental delivery.

Upon the following day, the patient was seen by me with Dr. S. M. Roberts, Dr. M. P. Jacobi, the professor of the chair, being out of town. The record of Dr. Roberts's examination was as follows: Head asymmetrical, antero-posterior diameter shortened, flattening in the right temporal region, with bulging in the left temporal, extending backward; fulness in the right occipital, with a corresponding flatness in the left and a sulcus to the left of the median line in the occipital bone; the margins of the occipito-parietal suture thickened, also those of the inter-parietal and of the fronto-parietal sutures, but to a less marked degree; the fontanelles closed. The digits semi-flexed into the palm of the hand, the fingers over the thumb; the arms and forearms in a position approaching extension and pronation, with some stiffness of the muscles which could be readily overcome; the emaciation of the lower extremities more marked than that of the upper, the patellar tendon reflexes somewhat exaggerated; marked adduction of the thighs, the legs crossed just below the knees, the knees flexed at an angle of about 90° ; feet in a state of extreme extension on leg; toes straight; the right leg extending freely upon the thigh; the left leg also extending, but less freely; irritation of the ham-string muscles causing contraction of the quadriceps extensor; all the contractures being readily overcome. Although, as previously stated, the patient could kick vigorously when annoyed by examination, when held up with her legs uncrossed, both limbs would be strongly adducted and extended, all of the articulations would become rigid, the tips of her toes only would touch the floor, and no effort could induce her to make any voluntary movement. There was no muscular tremor either in the upper or in the lower extremities. The child heard well, and could recognize individuals. She would smile when spoken to by her mother, and at the sight of food when hungry; and she would cry when a stranger approached her; she could not, however, be called bright.

Dr. Roberts supported my diagnosis of injury at the time of birth, emphasizing particularly the evidence afforded by the sulcus in the occipital bone, and suggesting that the respiration was that which would occur from a laryngeal growth.

On June 29, 1883, she was seen by Dr. Amidon, who confirmed the

previous examination, but substituted a diagnosis of chronic hydrocephalus, with descending sclerosis of the lateral tracts.

During a part of the summer, while I was absent from the city, Dr. Amidon kindly attended the case. Nothing of particular interest occurred during this interval.

August 10, on my return, the patient was presented, with a temperature of 101.5° F., and with a history of intestinal catarrh. These symptoms were relieved by treatment, but August 23, the mother again returned, saying, that for three or four days the patient had had attacks, which she designated as "cramps," having four or five in the course of twenty-four hours. While in my office the patient had one of these attacks, it lasted five seconds; the head was drawn backward, the eyes were staring, and mouth open, as though in the act of a yawn. The whole body was rigid. The temperature was not at that time elevated, and the pulse was soft and slow.

Sodii bromidum was given, and on September 10th the mother reported that the convulsions were less frequent and less severe, but that the respiration was more than usually labored when the patient was sitting up. No unusual effort was apparent when sleeping or lying down. November 3d the child was presented at the clinic in its usual health. On the 10th its temperature was found to be 102.5° F., with increased pulse and respiration. It had a gastro-intestinal and bronchial catarrh. Fine râles were present all over the chest, excepting at the left apex, where the signs of consolidation were found.

November 11th, temperature in the evening 105.2° F., pulse very rapid and compressible; respiration 28. The *ala nasi* were widely dilated, and the respiration was very labored. The child had frequent spasms, lasting four to five seconds, sometimes would only appear as yawning, and again the eyeballs would be fixed and the limbs rigid. It sometimes bit its tongue. 12th, 9.30 A. M., temperature 101° ; pulse small and rapid, and the respiration too much interfered with for counting. The child would appear to cry, but would make no sound. During my visit four or five spasms occurred with slight intervals, and then three to four minutes would intervene, when they would recommence. There was great difficulty in giving nourishment. 3 P. M. I visited the child again in company with Dr. S. M. Roberts. The temperature was then 104° F., and the pulse was rapid and weak. The respiration was hoarse and wheezing, with accent upon the beginning of expiration. The spasms were being constantly repeated, with but short intervals of rest. Upon the onset of the attack, there would be a rapid hoarse inspiration, followed by a prolonged expiratory effort. There appeared to be spasm of all of the expiratory muscles, extending to all the voluntary muscles, accompanied by opisthotonos. The eyes were fixed, and the lower maxilla was retracted. The veins of the neck were distended, especially upon the left side. At one time there was a question if there was not a spasm of the inspiratory muscles. The patient's general appearance was that of a child straining at stool, and a spasm of the diaphragm was suggested. Pot. bromid. 5 grs. was given every two hours. The child died that night, apparently while sleeping; the convulsions having become less and less marked.

The *autopsy* was made by Dr. Amidon upon the following day.

General emaciation was present. The lower extremities were in a state of extreme extension. Length of body $30\frac{3}{8}$ inches. The left foot

was adducted and lying over the right; the left leg was $\frac{3}{4}$ inch shorter than the right. Length of the right lower extremity $13\frac{3}{8}$ inches, with a circumference at the ankle of 3 inches. Length of the left lower extremity 13 inches, with a circumference at ankle of $2\frac{3}{4}$ inches. Measurements of the upper extremities were not taken. No disturbance in the nutrition of the skin upon any part of the body.

Lungs: Signs of a recent broncho-pneumonia upon both sides. Heart: Abnormally large; valves normal; walls of left ventricle thicker than those of the right, in proportion of four to one. Liver rather large, otherwise normal. Kidneys normal. Spleen normal. Lungs in a state of broncho-pneumonia, consolidation at both apices, most marked on left side; hypostatic congestion at base posteriorly. The larynx contained vegetations which involved both vocal cords, upon the right side, extending to the anterior commissure, and across to the other sides, implicating both ventricles, and making the surface of the ventricular folds irregular and puckered. The larynx was rather small, but not otherwise abnormal. It was seen by Dr. Elsberg, who thought that the epiglottis had the appearance of having been pendulous during life. Dr. Elsberg made a microscopical examination of the growth, and reported that the apparent vegetations were composed of the natural tissue of the part.

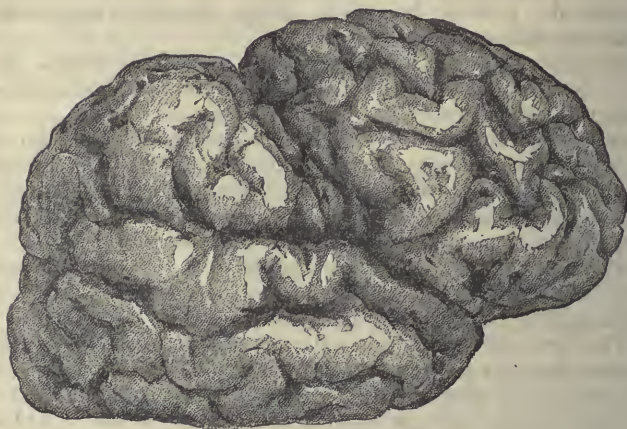
The head was sixteen and one-quarter inches in circumference, it was asymmetrical, the bi-temporal diameter being longer than the fronto-occipital. There was bulging in the left, and flattening in the right temporal region. A bald space was to be seen a little to the right of the crown. Upon removing the integument, fulness was to be found also in the upper angle of the left frontal, extending into the parietal region; a prominence was present also in the right occipital region. The interparietal and the fronto-parietal sutures were marked. The occipito-parietal suture was better united than the others. The fontanelles were completely closed. The skull was, however, very thin, especially in the occipito-parietal region. Upon removing the calvarium, the right occipital fossa was found to be considerably larger than the left. More arachnoid fluid than is normal was found.

Fig. 1.



Left hemisphere. Atrophy of the ascending frontal convolution; atrophy of the ascending parietal convolution; atrophy of the paracentral lobule, and possibly atrophy of the anterior part of the first temporal convolution. (About $\frac{2}{3}$ actual size.)

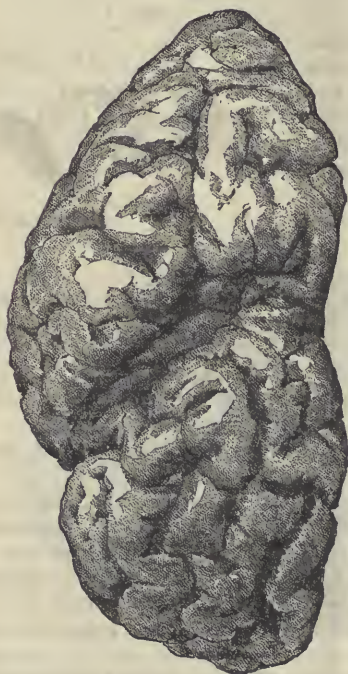
Fig. 2.



Right hemisphere. Atrophy of the ascending frontal convolution; atrophy of the ascending parietal convolution, and atrophy of the paracentral lobule. (About $\frac{2}{5}$.)

There was everywhere œdema of the pia, but especially in the fissure of Rolando. At the junction of these fissures with the longitudinal fissure, a large collection of fluid was found under the pia, and upon its evacuation

Fig. 3.



The right hemisphere viewed from above.

atrophy of the cortex about the fissure of Rolando, upon both sides was disclosed. The veins of the pia were everywhere distended and tortuous.

There was right lateral curvature of the spinal column in the dorso-lumbar region. Macroscopically in the cord nothing abnormal was to be seen, but to the touch it seemed unusually firm.

Dr. William H. Welsh, who examined the specimens, sent in the following report :—

“In each cerebral hemisphere there is atrophy of the paracentral lobule, of the central convolutions and of the roots of the three frontal convolutions. This atrophy is somewhat more marked in the right than in the left hemisphere.

“In each hemisphere the situation of the central convolutions is occupied by a sulcus, the margins of which are the adjacent frontal and parietal convolutions. In this sulcus can be seen the atrophied central convolutions. The upper two-thirds

of the anterior central convolution, is, however, not readily seen upon the right side without drawing apart the adjacent posterior central and frontal convolutions.

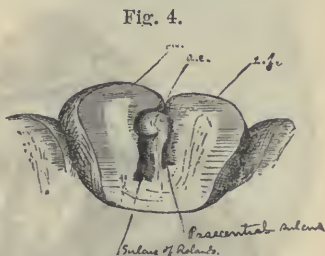
"The atrophy is most marked in the paracentral lobule, the anterior central convolution and the upper two-thirds of the posterior central convolution. The lower third of the posterior central convolution approaches nearly its normal size. The anterior central convolution appears as a narrow ridge nearly buried from sight in the depths of the sulcus. The pars opercularis of the inferior frontal as well as the roots of the remaining two frontal convolutions are distinctly atrophied, so that they do not appear to be more than one-half of their normal size.

"The length of the sulcus corresponding to the central convolutions is 7 cm. The depression corresponding to the paracentral lobule is 1 cm. in vertical and $1\frac{1}{2}$ cm. in antero-posterior diameter.

"The free edge of the right anterior central convolution measures only 1 mm. in diameter in its upper half, and 2 to 3 mm. in its lower half. The free edge of the posterior central convolution measures 3 mm. in diameter in its upper third, 4 mm. in its middle third, and 10 mm. in its lower third.

"The right cerebral hemisphere has been preserved intact, but vertical sections have been made through the left hemisphere in the antero-posterior direction. Upon such sections the situation and the extent of the atrophy can well be seen, although it will be remembered that the atrophy is less in this than in the right hemisphere.

"Upon a vertical antero-posterior section through the junction of the upper with the middle third of the central convolutions (represented in Fig. 4) the anterior central convolution (*a, c*) appears extremely atrophied in the depths of the sulcus. The anterior margin of the sulcus in this situation is the second frontal convolution (*2 f*) and the posterior margin is the posterior central convolution (*p, c*), also atrophied, but to a much less extent than the anterior central convolution. These margins nearly meet, so that from the free surface of the brain the anterior central convolution is hardly visible.



"Upon such a section it is evident that the atrophy involves especially that part of the central cortex which is adjacent to the floor and the sides of the præcentral sulcus and the sulcus of Rolando. There appears to be complete absence of the gray matter in the bottom and along the lower half of the sides of these sulci. The gray matter capping the top of the anterior central convolution is thinned, but it can be distinguished. The gray matter on the top of the posterior central and the second frontal convolutions appears to be nearly intact in this situation.

"In the situation under consideration, the anterior central convolution measures 8 mm. in vertical diameter; its transverse (antero-posterior) diameter in the depth of the sulcus is barely 2 mm., while near the free edge where the cortex appears partly preserved, the transverse diameter is 5 mm. Upon vertical section, therefore, the anterior central convolution is shaped something like a mushroom, there being a somewhat bulbous extremity upon a narrow stalk.

"That part of the posterior central convolution which makes the pos-

terior margin of the sulcus of Rolando is atrophied in a similar way. The posterior central convolution is much less atrophied in the left than in the right hemisphere. The posterior margin of the second frontal convolution is likewise atrophied. A section at a little different level shows that this atrophy involves the root of the convolution.

"In the remainder of the region already noted as the seat of atrophy an appearance similar to that described can be observed. The atrophy affects especially the gray matter immediately adjacent to the præcentral and the Rolandic sulci.

"The convolutions other than those mentioned as diseased appear of normal size. The anterior half of the first temporal convolution is possibly a little smaller than normal. The convolutions of the island of Reil appear normal.

"Upon *microscopical examination* it is found that the cortex in the bottom of the præcentral and Rolandic sulci is replaced by a finely fibrillated tissues rich in nuclei and in corpora amylacea. This rim of sclerotic tissue replacing the cortex measures about $\frac{1}{2}$ to 1 mm. in thickness. In this tissue no ganglion-cells or nerve-fibres are to be seen, and no trace of the different layers of the cortex can be made out. In the deeper parts of this tissue are bloodvessels surrounded by enormously dilated perivascular spaces containing lymphoid cells, large fatty granular cells, corpora amylacea, and in some places extravasated red blood-corpuscles.

Fig. 5.



Section through anterior central convolution, showing atrophy at the base. (Magnified ten times.)

"The margin of sclerotic tissue can be traced up for a certain distance along the sides of the anterior central convolution and then there appears rather abruptly a cortex 2 to 3 mm. in thickness, which can be traced over the top of the convolution where it has its greatest thickness. The sclerotic tissue, however, does not disappear, as it can be traced along the deeper parts of this cortex near the junction of white and gray matter. At the top of the anterior central convolution can be made out in normal succession, and of about normal thickness, the molecular layer, the layer of small and the layer of large pyramids, and then comes the sclerotic tissue with its abundant nuclei, fibrous texture, and dilated lymph-spaces. In following the cortex down the sides of the convolution it is seen that sclerosis invades from the deeper parts more and more of the cortex, the layer of large pyramids first disappearing, then that of small pyramids, while the molecular layer, although abnormally rich in nuclei, can be traced all of the way down the sides of the convolution. The impression is not that

of a sclerosis invading the cortex from the surface, but rather that of invasion from the deeper layers of the cortex or from the medullary substance.

"The ray of white substance included in the anterior central convolution is also sclerosed. Nerve-fibres, if they exist at all in this white substance, are naked axis-cylinders. In place of the medullary substance is a finely fibrillated tissue, rich in small round nuclei, and containing corpora amylacea and dilated perivascular spaces. This sclerotic tissue, although similar to that found in the cortex, is less dense and stains less deeply with carmine.

"Giant pyramidal ganglion-cells cannot be found, even in the gray matter on the top of the convolution where the cortex is best preserved. The processes of the ganglion-cells of the third layer appear shorter and fewer than normal. Still the ganglion-cells can be distinctly made out, present their normal triangular shape on section, and appear to be as abundant as usual.

"The parts of the posterior central and of the frontal convolutions, which have already been described as atrophied, present an appearance similar to that described. In the bottom of the Rolandic and præcentral sulci the cortex has entirely disappeared and is replaced by sclerotic tissue; in ascending along the sides of these sulci the cortex begins to appear, first as the molecular layer, then the layer of small pyramids, and at the top of these convolutions all of the layers can be made out, the sclerotic tissue can be traced as described along the deeper parts of the cortex up to the summit of the convolution where it ceases. The sclerosis invades also the white matter adjacent to the atrophied cortex.

"The pia mater over the atrophied parts of the cortex is somewhat thicker than normal, and its vessels are distended. It is also somewhat richer in cells than normal, but beyond this it presents no marked lesion.

Fig. 6.

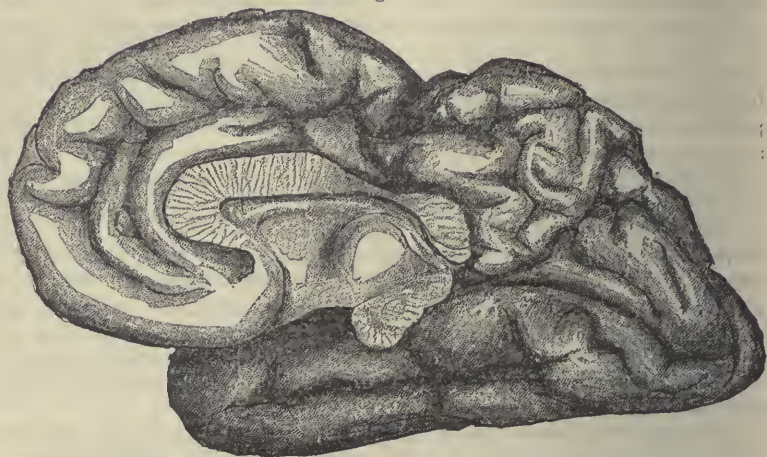


Section through medulla.

"There is a typical bilateral secondary degeneration of the pyramidal tracts. The parts which have thus far been examined microscopically are the pons, the medulla oblongata, and the spinal cord. In the pons most of the bundles of longitudinal fibres are degenerated; in the medulla oblongata the degeneration is confined to the anterior pyramids, which to the naked eye appear smaller and flattened. In the spinal cord the degeneration involves the pyramidal tracts in the anterior and in the lateral columns of both sides. The situation of the pyramidal tracts in the pons, medulla, and cord is occupied by a finely fibrillated and granular tissue containing some naked axis-cylinders, but very few medullated nerve-fibres. The tegumental portion of the pons, all of the medulla

oblongata except the anterior pyramids, and all of the spinal cord except the pyramidal tracts are normal. The nuclei of the hypoglossal, the pneumogastric, and of the cranial nerves are normal. The ganglion-cells of the anterior horns of the spinal cord are normal in number, size, and general appearance.

Fig. 7.



Internal aspect of right hemisphere, showing the atrophied præcentral lobule, with the atrophied band in the cælosum.

“There is atrophy of that part of the corpus callosum which may be considered to contain the commissural fibres of the two motor cortical areas. A short distance posterior to the genu the corpus callosum is very thin for a distance of about 2 ctm. It then becomes abruptly thick and normal again. The genu, the splenium, and the posterior half of the corpus callosum are of normal thickness and contrast markedly with the atrophied portion.

“No lesion has been found in any parts of the central nervous system other than those described. The cerebellum and the cerebral convolutions, except those already mentioned as atrophied, are normal both macroscopically and microscopically as far as examined.

“The disease is therefore sclerosis of the greater part of the motor cortical area in both hemispheres, with secondary descending degeneration of the pyramidal tracts.”

The diagnosis of double hemiplegia has been given to this case because it presented the lesion of infantile spastic hemiplegia symmetrically distributed upon both sides of the brain. It is only the third, or at the most the fourth case of its kind which we have found upon record. Yet these cases do not appear to us to be very uncommon, we have another now under our care, and three others presenting similar symptoms are known to be now in the city. As a distinct condition, even simple infantile spastic hemiplegia has but lately received the attention of text-books; Ziemssen’s¹

¹ Hitzig, Ziemssen’s Cyclopædia, xil. p. 124.

Cyclopædia mentions it in a foot-note; Ross¹ mentions it, citing a number of cases, and Strümpell² refers to it, but not fully. No widespread interest has been excited in the subject. For this reason, and on account of our own mistaken intra-vitam diagnosis, with the difficulty which we experienced in arriving at any comprehensive literature of the subject, we present the collection of facts and theories which follow. As a treatise it is, and in the present state of the subject it could not but be imperfect. If it should merely prove suggestive to further study of this interesting condition, it will have served its purpose.

History.—Infantile spastic hemiplegia is the clinical designation of a disease which has been many times described under other terms. As cerebral agenesis, Cazauvieilh,³ in 1827, described twelve cases, in six of which autopsies were made. Cazauvieilh says, that the condition had been previously described, and quotes Morgagni as having recorded a case. Heschl,⁴ in 1859, and Kundrat,⁵ in 1882, included a number of cases with hydrocephalic and microcephalic cases under the title of porencephalic defects. Little,⁶ in 1862, included twelve cases in over fifty cases reported, as the spastic rigidity of the new-born. As cerebral atrophy, Henoch⁷ has described a number of cases. Also, under the same title, Steffen⁸ has collected and described cases. Meigs and Pepper⁹ have described several cases as symptomatic contraction with rigidity. More recently Rénoy¹⁰ has described a case; and still more recently, during 1884, Lambl,¹¹ Lachi,¹² and Bianchi¹³ have described cases as porencephalic defects. Lambert Ott¹⁴ has described a case as unilateral spasm hemiplegia and aphasia following measles. As double infantile hemiplegia Jonathan Hutchinson¹⁵ has described a case which is yet alive.

The main features of the cases having autopsies are tabulated below.

¹ Ross, *Diseases of the Nervous System*, ii. 450, 1883.

² Strümpell, *Lehrbuch d. spec. Path. u. Ther. d. inner. Krankheiten*, ii. 349, 1864.

³ Cazauvieilh, *Arch. Gén. de Méd.*, xlv. p. 5, 1827.

⁴ Heschl, *Prag. Vierteljahrsschrift f. p. Hkd.* 1859, i. 59.

⁵ Kundrat, *Die Porencephalie*, Graz, 1882.

⁶ Little, *Obs. Tr.* London, iii. 1862.

⁷ Henoch, *Dis. Children* (Wood's Library), p. 108.

⁸ Steffen, *Gerhardt's Kinderkrankheiten*, xix. p. 243.

⁹ Meigs and Pepper, *Dis. Children*, p. 593, 1882.

¹⁰ Renoy, *Progrès Méd.*, 1879, p. 769. *Bull. de Soc. Anat. de Paris*, 1881, p. 740.

¹¹ Lambl, *Arch. d. Psych. u. Nervenheilkunde*, xv. 1, p. 45, 1884.

¹² Lachi, *Riv. Clinica*, Feb. 1884, p. 152.

¹³ Bianchi, *Abst'd in Jour. of Psych. and Neurology*, Nov. 1884.

¹⁴ Ott, *Tr. Phil. Neurolog. Soc., J. N. & M. Dis., Apl.* 1884, p. 256.

¹⁵ Hutchinson, *Tr. Path. Soc. London*, 1882, xxxiii. p. 27.

Cases of Infantile Spastic Hemiplegia.

No.	Physician.	Sex and age.	Seizure.	Symptoms.	Autopsy.	By whom reported and where.
1	Heschl,	M. 26 yrs	From birth left extremities weak.	Left hemiplegia; contractures; speech impaired.	Central segment centrum ovale with convolutions pertaining to it absent on right side from the convexity to the fissure of Sylvius.	Kundrat, Die Porencephalie, 1882.
2	Heschl,	F. 7 yrs	.....	Right hemiplegia, with contractures.	Absence of ascending convolutions left hemisphere defective, communicates with lateral ventricle of that side.	Kundrat, Die Porencephalie, 1882.
3	Brechet,	F. 3½ yrs	.....	Right hemiplegia, atrophy.	Left hemisphere defective.	Kundrat, Die Porencephalie, 1882.
4	Maschede,	F. 27 yrs	.....	Left hemiplegia.	Right parietal bone defective ½ in. behind coronal suture, the opening 3 in. by ½ to 1 in. Right hemisphere presents cavity in posterior half. Walls of connective tissue of neighboring convoluted rusty brown.	Kundrat, Die Porencephalie, 1882.
5	Rogers,	M. 41 yrs	When 15 yrs unconscious 3 weeks; recovered with paralysis of left leg and arm.	Left hemiplegia, with atrophy.	Anterior half of right hemisphere atrophied.	Kundrat, Die Porencephalie, 1882.
6	Rogers,	M. 49 yrs	Dates from convulsions in youth.	Right hemiplegia, weak minded.	Left hemisphere has a cavity connected with ventricle.	Kundrat, Die Porencephalie, 1882.
7	Hügel,	F. 5 yrs	Asphyxiated at birth.	Left hemiplegia.	Right hemisphere presents an excavation in anterior half 1½ x 2 x ½ in.	Kundrat, Die Porencephalie, 1882.
8	Brodowski,	F. 12 yrs	.....	Right hemiplegia, strabismus, nystagmus.	Communication between fissure of Sylvius and ventricle. Surrounding convolutions converge into this cavity.	Kundrat, Die Porencephalie, 1882.
9	Kundrat,	M. 15 mo	.....	Left hemiplegia, contractures.	Right hemisphere atrophied, especially about fissure of Rolando.	Kundrat, Die Porencephalie, 1882.
10	Kundrat,	F. 5 yrs	1 year before death.	Double hemiplegia, idiosyncrasy.	Atrophy about lower ½ fissure of Rolando; right more affected than left. Sulcus communicates with lateral ventricle. Septum pellucidum absent.	Kundrat, Die Porencephalie, 1882.
11	Sperling,	F. 29 yrs	Difficult labor.	Hemiplegic at birth; shortening of the arm and leg, contractures of hand; intelligent, was a chorister;	Depression behind fissure of Rolando, including the ascending parietal convolution; cicatricial tissue and pigment.	Kundrat, Die Porencephalie, 1882.
12	Cazauvielh	F. 59 yrs	.....	Left hemiplegia, contractures. Sensibility and intellect not impaired.	Convolutions of right hemisphere less developed than left.	Cazauvielh, Arch. Gén. de Méd., 1827, xiv. p. 5.
13	Cazauvielh	F. 51 yrs	.....	Right hemiplegia, including face; right mamma undeveloped.	Convolutions left hemisphere less developed than right; intellect obtuse.	Cazauvielh, Arch. Gén. de Méd., 1827, xiv. p. 5.
14	Cazauvielh	F. 42 yrs	.....	Left side paralyzed and undeveloped.	Right hemisphere atrophied.	Cazauvielh, Arch. Gén. de Méd., 1827, xiv. p. 5.
15	Cazauvielh	F. 30 yrs	.....	Left half of body emaciated, especially leg; mouth drawn to right side. Epileptic; voracious appetite; intellect obtuse.	Left hemisphere defective.	Cazauvielh, Arch. Gén. de Méd., 1827, xiv. p. 5.

Cases of Infantile Spastic Hemiplegia.—Continued.

No.	Physician.	Sex and age.	Seizure.	Symptoms.	Autopsy.	By whom reported and where.
16	Cazauiellh	F. 68 yrs	From birth.	No voluntary movements; right side of mouth drawn to left; contractures.	In posterior part of left frontal lobe, a cavity having an "accidental" opening into the ventricle.	Cazauiellh, Arch. Gén. de Méd., 1827, xiv. p. 5.
17	Cazanviellh	F. 27 yrs	.....	Right hemiplegia, with atrophy.	Left frontal lobe less prominent than right.	Cazauiellh, Arch. Gén. de Méd., 1827, xiv. p. 5.
18	Morgagni,	....	.....	Hemiplegia.	Atrophied zone from convexity to base, in frontal lobe, most marked in medullary substance.	Cazauiellh, Arch. Gén. de Méd., 1827, xiv. p. 5.
19	Little,	18 yrs	Instrumental delivery; mother died.	Right hemiplegia, with atrophy and contractures.	Whole left hemisphere atrophied; surface of right hemisphere cicatrized with remnant of old clot.	Little, Trans. Obst. Soc., London, 1862.
20	Gibb,	Still-born.	Mother during pregnancy received an accidental blow on abdomen by a board.	Rigid contractures of joints of limbs of left side, without breaking tendons could not be extended.	Right parietal bone echymosed; remains of old clot in right hemisphere above ventricle.	Gibb, Lancet, Nov. 13, 1853.
21	Fullain,	F. 8 yrs	.....	Atrophy right extremities; intelligence small.	Left hemispheres smaller than right.	Steffen, Gerhart's Hdb. Kinderkrankheiten, xix. p. 243.
22	Bourneville,	F. 16 yrs	At 16 months with spasms of right extremities.	Right hemiplegia, atrophy.	Atrophy of left hemisphere especially of ascending frontal, ascending parietal, paracentral lobule, and 1st frontal convolution.	Steffen, Gerhart's Hdb. Kinderkrankheiten, xix. p. 243.
23	Henoch,	F. 19 yrs	At 3 months convulsions, followed by paralysis.	Right hemiplegia, atrophy, contractures; speaks in one syllable; intellect poor.	Middle upper part of left hemisphere occupied by cyst; right pyramid $\frac{1}{2}$ normal size; hematoidin crystals in wall of cyst.	Henoch, Hd. f. d. Kinderkrankh., 1883, p. 231.
24	Henoch,	F. 12 yrs	.....	Right hemiplegia, atrophy, contractures.	All convolutions of left hemisphere small, rusty brown color; pia adherent.	Henoch, Hd. f. d. Kinderkrankh., 1883, p. 231.
25	Henoch,	F. 5 yrs	Healthy to 1 $\frac{1}{2}$ years. After carriage accident suddenly paralyzed	Left hemiplegia; destructive temperament; speech impaired.	Right upper frontal convolution atrophied, posteriorly, dense, and white.	Henoch, Hd. f. d. Kinderkrankh., 1883, p. 231.
26	Henoch,	M. 6 yrs	Healthy to 6 months, then had measles with convulsions 8 days followed by general muscular rigidity.	Double hemiplegia; contractures; stuttering; imbecility.	1st frontal convolution on both sides atrophied, also 2d but in less degree. Corpus callosum, fornix, and septum lucidum atrophied.	Henoch, Hd. f. d. Kinderkrankh., 1883, p. 231.
27	Rénay,	F. 4 yrs	From convulsions at birth.	Left hemiplegia, contractures, strabismus; spoke badly; intelligence weak.	Atrophied right hemisphere especially about fissure of Rolando, with secondary degeneration of pyramidal tracts.	Rénay, Progrès Méd., 1879, p. 769.
28	Huebner,	2 $\frac{1}{2}$ yrs	When 15 months had fever with convulsions followed by complete paralysis.	Double hemiplegia, contractures of extremities; little intelligence no speech.	Atrophy of both ascending convolutions of left hemisphere with anterior part of right inferior parietal lobule; right lenticular nucleus. Anterior half of pons, with pyramidal tracts in it destroyed. Embolus found in right middle cerebral artery from root to bifurcation	Huebner, Berl. klin. Wochschr., 1882, p. 737.

Cases of Infantile Spastic Hemiplegia.—Concluded.

No.	Physician.	Sex and age.	Seizure.	Symptoms.	Autopsy.	By whom reported and where.
29	Suckling,	....	.....	Hemiplegia contractures, atrophy, epilepsy.	Atrophy about fissure of Rolando.	Suckling, Bir. Med. Rev., 1883, p. 55.
30	Ross,	F. 2½ yrs	Congenital.	Double hemiplegia; monosyllabic speech.	Sulcus occupying central convolutions on both sides; bottom sulcus opened into lateral ventricle; pyramids and lateral columns small. No cicatricial tissue. Giant cells of third layer absent in atrophied part.	Ross, Dis. Nerv. Syst., 1883, vol. II. p. 480.
31	Lambl,	F. 12 yrs	.....	Right hemiplegia, strabismus, myasthmus; intelligence good; practised clairvoyance.	Depression in left hemisphere occupying fissure of Sylvius; lower part of ascending convolution of island of Reil and anterior part of first temporal convolution atrophied.	Lambl, Arch. d. Psych. u. Nervenheilkunde.
32	Lachi,	F. 44 yrs	.....	Right hemiplegia, with weakness of left leg; atrophy and contractures.	Atrophy about anterior part of fissure of Sylvius on left side; bottom of fissure opens into ventricle; septum lucidum absent.	Lachi, Rev. Clinica, Feb. 1884, p. 152.
33	Bianchi,	M. 73 yrs	Convulsions in early infancy.	Right hemiplegia, with weakness of left leg; atrophy and contractures.	Deep sulcus occupying central convolutions of left hemisphere, communicating with ventricle. Similar sulcus occupying superior third of central convolutions of right hemisphere. Paracentral lobule not affected. No descending degeneration.	Bianchi, Abgt. Am. J. Neurol. and Psychiatry.
34	McNutt,	F. 2½ yrs	Feet presented; instrumental delivery; convulsions for 9 days after birth.	Double hemiplegia; contractures, dysphagia and dyspnoea; intelligence small.	Atrophy about the fissure of Rolando on both sides. Atrophy affects most the base of convolution, giving mushroom shape. Descending degeneration of both pyramidal tracts. Atrophy of larynx with puckering of mucous membrane over vocal cords.	McNutt, AMER. JOUR. MED. SCI., Jan. 1885.

Pathology.—From the foregoing table it will be seen that each of these cases presented a gross defect of the cerebral cortex located near the fissure of Rolando. The older writers mention it with some indefiniteness as atrophy of the hemisphere, atrophy of the frontal lobe of the hemisphere, atrophy of the posterior part of the frontal lobe as in one of Cazauvieilh's cases, or as an atrophied zone of the frontal lobe as in Morgagni's case. The more recent writers, however, locate it according to the modern nomenclature for the motor area of the brain. Suckling's case had atrophy about the fissure of Rolando. Rénoy's case had atrophy of the right hemisphere, especially about the fissure of Rolando. Lambl's case had atrophy of the lower part of the central convolutions. Bianchi's case had atrophy of the central convolutions upon both sides. This was

also true of Ross's case and of our own. When the atrophy did not immediately border the fissure of Rolando, it was in a neighboring part; thus Henoch's boy had atrophy of the first and second frontal convolutions upon both sides, and in Lachi's and Lambl's cases the region about the anterior part of the fissure of Sylvius was affected.

The parietal and the temporal lobes have been implicated in some cases.

The cerebral lesion has, as a rule, the appearance of an excavation of the surface of the hemisphere, into which excavation the gray matter of the cortex dips. Morgagni's case is said to have had atrophy especially of the medullary portion of the zone. Of our own case Dr. Welsh remarks that "the impression is not that of a sclerosis invading the cortex from the surface, but rather that of invasion from the deeper layers of the cortex or from the medullary substance." Heschl describes the atrophy in one of his cases as absence of the centrum ovale pertaining to the part.

Openings from the bottom of the excavation into the lateral ventricle were present in eight of our thirty-two cases. Where such a sinus occurred the surrounding convolutions usually converged toward the pit. On account of the sinus these cases were called porencephalic from *porus*, a passage, but as the sinus with the convergence of the convolutions was considered to indicate primitive malformation, porencephalic came to be applied to all supposed congenital defects. Kundrat applies it still more widely to all defects of which absence of tissue is a mark. Atrophy of the corpus callosum was present in Cases 26 and 34. In each of these cases the cortical atrophy extended to the median fissure. Atrophy or absence of the septum lucidum is mentioned of Cases 10, 26, and 32. In Cases 10 and 32, the lower part only of the central convolutions was defective. Not many microscopic examinations have been made. Sclerotic tissue with absence of the proper nerve tissue of the part, characterized the cortical atrophy at the base of the convolutions in our own case; at the convexity of the convolutions also the processes of the third layer were small. An absence of processes was characteristic of Bianchi's case, and in Ross's case the cortex was embryonal in type. All of Henoch's cases showed cicatrization about the focal lesion. Secondary degeneration was present in Renoy's case, and also in our own. In Bianchi's case and in Ross's case there are said to have been neither cicatricial nor sclerotic tissue to be found.

Steffen¹ says, that atrophy of the brain can occur either from an arrest of development or from a process of pathological degeneration in an already developed part. In the first class of cases the color of the atrophied part is less bright than in the normal condition, approaching the gray red tint and the consistency is less. The arrest of development is said to be seen in the persistency of low forms, and in the more or less

¹ Steffen, loc. cit.

considerable number of naked axis cylinders, while in the material for the construction of their medullary sheath are to be found masses of granular cells. In the atrophy which results from a degenerative process, on the contrary, the atrophied parts are more or less dense, gray-white, and have an irregular surface showing furrows and pits. As the rule, a puckered cicatrix forms, and the surrounding portion of the cortex undergoes a diffused sclerosis. With retraction, the motor area becomes diminished in size. Thus the spastic hemiplegia of infancy is sometimes named unilateral atrophy of the brain. The fibres of the pyramidal tract undergo a descending sclerosis, and consequently the anterior pyramid of the medulla on the side of the lesion is usually atrophied, while microscopic examination of the cord shows sclerosis of the lateral column of the opposite side.

Cazauvieilh's observations upon this disease harmonize more perfectly with modern pathology than do those of many more recent writers. Cazauvieilh described cerebral agenesis as having its origin either during infancy or during intra-uterine life, the resulting defect being with or without a tissue change. As a rule, late intra- or extra-uterine arrest appears to be accompanied by the development of cicatricial tissue in and about the atrophied part.

Symptoms.—The subjects of infantile spastic hemiplegia may live to old age. Cazauvieilh's cases were in middle life, and Bianchi's case was 73 years at the time of death. The inception of the disease, however, always dates back to early childhood, or to intra-uterine life. At whatever age seen, its victims are characterized by more or less complete hemiplegic motor inability, with contractures and defective development of both bones and muscles. This defective development is called atrophy. It is not atrophy in the sense of a retrogression, as the faradic reaction never is lost. The atrophy and paralysis may be unilateral or bilateral. In the bilateral affection both hemispheres of the brain have presented defects, as in Cases 10, 26, 28, and 34. The paralysis may extend to the face, which is affected on the same side. Nystagmus and strabismus were present in Cases 8 and 31. In both of these cases the parts about the anterior portion of the fissure of Sylvius were defective.

True aphasia may be present; monosyllabic utterance is mentioned for a number of cases. A case now under my care can speak a two-syllable word only by making two separate efforts at its articulation, and for the second syllable he requires prompting. Having pronounced the first he forgets the necessity for the second. Dr. Ott's case pronounces the first syllable, and completes his remark by a gesture indicating the object required. One of Ross's cases, also one of Henoeh's cases, had monosyllabic speech. Of one of Cazauvieilh's cases, which lived to womanhood, it is said that she spoke but seldom and in an abrupt manner.

Dysphagia is mentioned of a number of cases. The peculiar dyspnoea and stridulous respiration exhibited by Elsie, with the arrested laryngeal

growth, is mentioned only by Little, and by him simply in an incidental way.

Idiocy may or may not be present. Lambl's case practised clairvoyance, and was very bright. Ross mentions a great scholar who was an infantile hemiplegic. Bichat is said to have had unilateral atrophy of the brain. Four cases of double hemiplegia are furnished by our list, two others are known to us in which autopsy has not been made; all were imbecile.

To recapitulate: The symptoms of infantile spastic hemiplegia are hemiplegic motor inability, atrophy, and contractures, with or without aphasia, monosyllabic utterance, dysphagia, dyspnoea, and idiocy, the latter being especially characteristic of the double affection.

Etiology.—The etiology of infantile spastic hemiplegia has been defined as primitive defect, arrest, encephalitis, and hemorrhage.

Clinically the cases of infantile hemiplegia may be divided into three classes, those in which the inception of the condition precedes birth, those in which it occurs after birth, and those of which parturition is the cause. In the first class of cases the defect has been considered allied to the defect of microcephalic and anencephalic brains. Maternal impressions, a lack of formative force, primitive abnormal distribution of bloodvessels, and an abnormal influence of the sympathetic nerve, has each been cited for its explanation. Hervouet¹ has recently claimed that not even apparent sclerosis opposes the theory of primitive defect, diagnosing that circumstance in the case of an idiotic child, in whom the whole anterior part of the brain was shrunken and hard. Heschl, on the contrary, thought that even in intra-uterine cases a morbid process, as meningitis or encephalitis, had occurred. Gibbs's case would indicate that traumatism with hemorrhage may, even during intra-uterine life, be one of its factors. This case was stillborn. It presented hemiplegic atrophy with contractures which, without cutting the tendons, could not be overcome. The opposite parietal bone was ecchymosed, and the hemisphere under it presented the remains of an old clot. During her pregnancy the mother had received a severe blow upon the abdomen.

In the second class of cases, the child, previously healthy, is seized with fever and convulsions, sometimes during or after an acute disease. These symptoms subside to give place to hemiplegia with rigidity, with or without the implication of cerebral nerves. This paralysis gradually disappears, or it does not disappear. In the latter case the paralyzed part ceases to grow, and at the autopsy atrophy with sclerosis may be found in the cerebral motor tract. An interesting etiological suggestion has been made for these cases by Benedikt, whom I find quoted by Strumpell:² this suggestion is, that the spastic hemiplegia of infancy is a systematic affection of the

¹ Hervouet, Arch. de Phys., August 15, 1884.

² Strumpell, l. c.

motor cerebral cortex, analogous to the polio-myelitis of the anterior horns. He compares the access of this disease with the access of polio-myelitis in infants, finding the prodromata very similar, and the origin of each equally obscure. The theory is alluring, but, on the other hand, these hemiplegias have been particularly associated with measles, an association which has suggested intracranial hemorrhage even for them from the blood dyscrasia of this disease. Also it will be remembered that in Case 23 hæmatoidin crystals were found in the neighborhood of the focal lesion, while in Case 24 the shrunken convolutions were of a rusty color. Steiner¹ considers cerebral hemorrhage in the course of the acute zymotic disease to be due to fatty degeneration of the walls of the vessels.

For the third class of cases, Ross² has suggested hemorrhage from an injury during the process of birth. In this theory Ross acknowledges the priority of Little, who, in 1862, had advocated hemorrhage at birth as a cause for the spastic rigidity of the newly-born, referring this condition, in spite of his autopsy, to a spinal origin. Little cited sixty-three cases, including the hemiplegia, which we have quoted, together with eleven other unilateral and bilateral hemiplegias in which autopsies were not made. In all of these cases abnormal circumstances attended the delivery. One was born cyanosed, and had convulsions after birth, in one turning was performed, and it did not breathe for one-half hour; another had convulsions for forty-eight hours after birth; another "lay as if dead" for six weeks after birth; another had the cord around its neck, and did not breathe for ten minutes; another was a foot presentation, and was insensible for two hours after birth; another had convulsions for two days after birth; for another instruments were used, and the child was restored with difficulty; another was asphyxiated for two hours after birth; another was delivered by the feet—it did not cry for two hours; another was a cross presentation, and was delivered by instruments; another was "black" when born, and another had convulsions during three days after birth.

Ross states that in a number of his own cases the feet presented at the birth. Our case here reported was a foot presentation, the labor was difficult, and convulsions with the paralysis immediately followed the delivery. Still more conclusive evidence of parturition with an after-coming head, in the etiology of infantile hemiplegia, is afforded by the two cases reported by the writer in the *Am. Jour. Obstet.*, Jan. 1885. Both were breech presentations. In the first case ten minutes were occupied in delivering the head, and when born the cord had ceased to pulsate. Resuscitation was accompanied by paralysis of the right arm, the child became gradually comatose during the six days of its life, and upon autopsy a large clot was found covering the convexity of the posterior half of the left hemisphere of the cerebrum. Case 2 lived twenty-two

¹ Steiner, *Compend. Children's Diseases*, 1875, p. 24.

² Ross, *Brain*, vol. v. No. 3, p. 344, 1882.

days. During that time it had convulsions with paralysis of the whole of the left side, including the extremities and the face. The left eye was always open. Upon autopsy the right hemisphere was found covered by a clot which dipped into the fissure of Rolando, and on account of destruction of tissue was separated from the lateral ventricle here only by the ependyma. The history of these two cases is similar to Elsie's history, to the history of Ross's cases, and to the history of Little's cases. It is a legitimate conclusion that had they lived, Case 2 at least would have developed by cicatrization the shrinkage of the central convolutions, and possibly the sinus, into the lateral ventricle with the convergence of the neighboring convolutions, which characterize the most marked cases of this disease.

The intracranial hemorrhage of young children is meningeal in type. In the newly-born¹ it is said to occur usually at the base of the brain. Cruveilhier² found the effusion about the base of the brain and the cerebellum, or at the most, covering only the posterior cerebral lobes. Cruveilhier's cases lived only a number of hours. Paralysis was not present in any case.

The non-recognition, by this great teacher, of meningeal hemorrhage in other localities, is probably due to the fact that the subjects of hemorrhage at the base, as a rule, die, and immediate autopsies are obtained, while hemorrhage at the vertex does not so constantly destroy life, and hence possibly escapes analysis. Little complains of our slight information regarding the influence of the accidents of birth upon their living subjects, among whom he includes cases of club-foot, wry neck, and many other minor deformities. Little considered the deformity of Richard III. to have belonged to the same category, quoting the Shakspearian lines regarding his halting gait, together with the mention of Sir Thomas Moore, that the Duchess of Gloucester had much ado in her travail, he (Richard III.) being born the feet forward.

The rupture in meningeal hemorrhage can seldom be located. In the Case II. which we have quoted from the *Amer. Journ. Obstet.*, the effusion would appear to have come from beneath the central convolutions, possibly from the surface of the ependyma. This is shown by the fact that the brain tissue was here so ploughed up and destroyed as to be replaced by a clot, the blood having evidently overflowed the fissure of Rolando before covering the hemisphere. The pronounced atrophy at the base of the convolutions in our own case may indicate an eccentric lesion. It may, however, have been produced only by the loss of the blood supply from ruptured vessels on the surface of the brain, for we must take into consideration the fact that the base of the convolution is developed later than the convexity, which is pushed out by the new growth, also the

¹ Cazeaux, Treatise on Midwifery, 1875, p. 413.

² Cruveilhier, Anatomie Path., xv. plate 1.

physiological law, that the part latest developed is the one that is most frequently malformed. Upon this proposition, the relative immunity of the convex portion of the convolution, only substantiates our theory of an injury at the time of birth, as according to Flechsig¹ the development of the convex portion would have been completed, while the development of the accessory portion is not yet completed, and hence still subject to inhibition at that time.

The atrophied callosum did not suggest a secondary change. Simple arrest in that part is not, however, opposed to the theory of injury at birth, for the reason that in the ninth months' fœtus only do its fibres commence to be medullated. From the sixth to the fifteenth week of extra-uterine life is the more usual time for their recognition.²

The symmetry of the lesion, in a case like our own, is apparently opposed to the theory of mechanical or hemorrhagic origin. This objection is, however, only apparent. Lebert,³ in 139 cases of cerebral hemorrhage, found twenty-one double, and where double, similar points on both sides were affected. While Bouchut,⁴ among forty cases of meningeal hemorrhage in adults, found in twenty-three of these cases both hemispheres affected. A symmetrical meningeal hemorrhage in our own case is, therefore, not improbable.

The dyspnoea and the laryngeal arrest is in our case an interesting feature. During life it was supposed that the functions of the pneumogastric were interfered with. Dr. Chapin⁵ has reported a similar respiration in connection with an inflamed pneumogastric nerve from the pressure of a bronchial gland. There was no dysphagia in his case. In our own case the pneumogastric nerves with their nuclei were intact. It is conceivable that the cerebral nerves are represented in the cortex. Seguin⁶ has had laryngeal paresis from hemorrhage into the third frontal convolution. It only remains to suggest that in our case this cortical vagus reserve was sufficiently encroached upon to cause the symptoms.

To recapitulate: The peculiarity of the atrophy in Elsie's case, namely, the immunity of the convexity of the convolutions with the atrophy of the callosum appears to locate the primitive lesion neither very much earlier nor very much later than the time of birth, while the difficult labor, and the convulsions, with the evidence afforded by the two cases which we have quoted, locate it still more closely in a hemorrhage just at that period. We therefore consider parturition to have been the cause for her condition, and one of the commonest agencies in the production of her

¹ Flechsig, *Leitungsbahn in Gehirn u. Rückenmark*, 198.

² Flechsig, l. c. p. 34.

³ Lebert, *Traité d'Anatomie Path.*, II. p. 60.

⁴ Bouchut, *Arch. Gén. de Méd.*, v. 261, 1839.

⁵ Chapin, *N. Y. Med. Jour.*, March 15, 1884.

⁶ Seguin, *Opera. Minor*, i. 205.

disease, spastic infantile hemiplegia. It also seems probable that not only the paralysis and atrophy of the extremities, but also the dyspnœa, the dysphagia, and the laryngeal atrophy must be referred to the cortical arrest.

Diagnosis.—Infantile Spinal Paralysis.—Infantile spastic hemiplegia must be differentiated in the first place from infantile spinal paralysis. The wasting, or non-development of the parts, might at a cursory glance suggest this disease. Infantile paralysis, however, has never been known to attack the whole body; one leg or one arm will be affected. Sometimes both lower extremities, but seldom both extremities of the same half of the body are paralyzed, never according to Niemeyer,¹ and but rarely according to Henoch.² Infantile spastic hemiplegia presents contractures also, and frequently the implication of the facial or other cerebral nerves. The faradic reaction is retained in the paralyzed muscles, the atrophy is slower, and the intelligence may be impaired.

Double infantile hemiplegia must be differentiated also from spastic spinal paralysis, from chronic hydrocephalus, from athetosis, from disseminate sclerosis, or steatosis of the brain, and possibly also from the “contracture idiopathique” of the French.

Spastic Spinal Paralysis.—Seguin’s³ tetanoid paraplegia or the spastic paralysis of Erb,⁴ consists in voluntary inability to control the part, with exaggerated reflex movements and contractures. It is bilateral. It commences in the lower extremities; and was first supposed by Charcot to be due to a primary sclerosis of the lateral columns of the cord. An autopsy demonstrating this connection was made by Dreschfeld,⁵ in 1881. Elsie’s condition simulated this state, in absence of voluntary inability, in the exaggerated reflexes in the muscular contractures, and, beyond all, in the fact that the loss of motility and these reflexes were bilateral in their distribution. The asymmetry of her head, however, with her inability to talk, her dysphagia and her dyspnœa suggested a brain complication.

Chronic Hydrocephalus.—There is little in the physical signs to distinguish a case of chronic hydrocephalus from a case of double infantile hemiplegia, if the skull be not increased in size. The rolling down of the eyeballs should be looked for, and failing this sign, a diagnosis would depend upon the history of the case.

Athetosis.—Bilateral athetosis is usually associated with idiocy; there is no true paralysis, and the peculiar movements which are more pronounced upon effort, serve to distinguish it. Of one such case, it is said, that she never was still, while in double infantile hemiplegia placidity is

¹ Niemeyer, *Practice of Med.*, vol. ii. p. 373, 1880.

² Henoch, *Diseases of Children*, p. 103 (Wood’s Library).

³ Seguin, *Archives of Medicine*, February, 1879.

⁴ Erb, *Berliner klinische Wochenschrift*, June 28, 1875.

⁵ Dreschfeld, *Tr. Inter. Med. Congress*, 1881, vol. i. 407.

the rule. Athetoid movements may, however, be present. Suckling mentions alternate flexion and extension of the fingers in two of his cases. The predominance of the hemiplegic symptoms must then be the diagnostic point.

Steatosis.—Concerning steatosis or disseminate sclerosis, the dividing line will be still more difficult to draw. Simon has recently reported a case of the latter affection, under the title of cerebral sclerosis (*Rev. Mens. des Mal. de l'Enfance*, March, 1884). This patient was a girl of nine years, completely paralytic, and presenting contractures in the paralyzed members, the position of which correspond with the description given for our own. The child was very restless, the paralytic and contracted limbs were continually in aimless motion, and she was usually crying or making inarticulate sounds. Her cutaneous sensibility was normal, but her intelligence was absolutely lost. She had a specific history, and at the autopsy were found nodules of induration over the anterior middle and superior parts of the brain, particularly in the frontal and in the parietal lobes. This degeneration affected not only the gray but also the white matter. The spots were of the size of a filbert, and were in some places of a red, and in others of a salmon color. The author considers a meningitis to have been primary in this case, and the origin to have been syphilitic. He says that the restlessness of the child was diminished under the mercurial and iodide of potash treatment, which was tried shortly before death. Though called cerebral sclerosis, this case appears to be identical with Parrot's¹ cases of steatosis of the new-born. These nodules Parrot supposes to be due to malnutrition, though frequently dependent upon a specific taint.

It appears to us that the so-called idiopathic contracture of the French need never be confounded with this condition, which it resembles only in the fact of the contractures with the symmetry of their distribution. Idiopathic contracture does not persist, there is no atrophy, and neither fever nor convulsions herald its approach.

In the differential diagnosis of double infantile hemiplegia the history of the development of the condition must have very great weight. Where the paralysis supervenes upon perfect health and occurs suddenly heralded by fever and convulsions the lesion of infantile spastic hemiplegia is to be suspected. Where the convulsions immediately follow birth, intra-cranial hemorrhage is with a considerable degree of certainty its cause.

Treatment.—In considering the treatment of infantile spastic hemiplegia, we may remember that absolute paralysis is not present; of one it is only said that her grasp was uncertain. Most patients are able to walk and in a fashion to use the paralyzed part; our own case, during the last months, commenced to grasp and became able to hold up her head. It is

¹ Parrot, *Arch. de Phys.*, p. 59, 1873, 1868, p. 784.

true that idiocy is frequently present, but it is not necessarily profound. We would therefore recommend passive exercise, gentle massage, and the careful use of the induced current with stimuli of an intellectual and moral character. Nourishing diet and fresh air are indispensable. Iodide of potassium with ergot has appeared to diminish the contracture and sensibly to improve the gait in one of the cases which I have now under my care. As prophylaxis prompt and speedy delivery of the aftercoming head may be emphatically urged.

One other consideration remains : in the class of cases proceeding from an injury at birth, not having been able to avoid the delay in delivery, and having the infant after birth in constantly repeated convulsions, during one, two, three, and even nine days, can nothing be done for its relief? With diffidence I desire to suggest the opening of the skull and the removal of the clot. Surely the danger to life and to health in these cases is sufficiently great to authorize such an operative procedure, if there be any possibility of success.

In concluding, we beg to present our acknowledgments to Dr. Amidon and to Dr. Roberts, also to Dr. Welch for the kind assistance which has made this study possible.

ARTICLE VI.

NOTE ON A PECULIAR FORM OF PULMONARY CONGESTION, NOT GENERALLY KNOWN AND TERMINATING IN SUDDEN DEATH; TOGETHER WITH A PLEA FOR CARDIAC ASPIRATION. By A. H. P. LEUF, M.D., Pathologist to St. Mary's General Hospital, Brooklyn, N. Y., and Secretary of the Brooklyn Pathological Society, etc.¹

THE two objects in writing this note are indicated in the title, *i. e.*, first, to draw attention to a peculiar form of pulmonary congestion that is not generally known nor properly understood, and which ends in sudden death; second, to enter a plea in defence of the operation of aspiration of the right heart, as originally proposed by Dr. B. F. Westbrook, of Brooklyn, N. Y., and performed by him in one case.

Facilities that I may presume to call unusual are afforded me every year in the study of the pathology of several hundred cases of sudden death. During the last two years, I have frequently met with cases of the kind I will describe more fully below. I have recorded, as well as I can now remember, a little more than one-half of those seen. My recorded

¹ Read before the Medical Society of Northampton Co., at Bath, Northampton Co., Pa., 1884.

cases number more than thirty, to which may be added three more made within two days of the present writing. Very seldom has it happened that I have been called upon to make an autopsy in these cases during the warm months. They occur most frequently in spring and fall, many also being encountered throughout the winter. The great majority, however, are met with in the course of the temperate seasons, when the weather is prone to change rapidly and in a marked degree.

In all of these cases, both lungs were affected, and to the same extent with only a few exceptions. Whenever a difference between the two sides existed, it was only slight. With rare exceptions, the lungs were uniformly affected, there being no patchy appearance on section and no evidence of either ante-mortem or post-mortem gravitation of blood. The narrow apex or sharp anterior margin was as full of blood as the rounded posterior border or the broad base resting upon the diaphragm. In those few cases in which the congestion was not uniform, but presented a patchy appearance, the lighter spots were no more numerous nor was their location better marked in the dependent parts of the lung than in other portions. Thus a light congestive patch would be found adjoining a coal black field of lung tissue at the sharp free anterior margin.

Similar conditions would be noticed throughout the same organ without reference to the laws of gravitation. When the congestion is uniform, the lung appears, on section, as black as ink, and slight pressure causes an exudation of thick and perfectly black blood. Very often there also exists considerable œdema, and this, also frequently, without depending on hypostasis, for it may be noticed in the uppermost parts of the organ, while hardly any is seen in the more dependent portions. Crepitation is, as a rule, present in all parts of the lungs, and where it is absent a condition of collapse is noted. Occasionally, of course, there are found solid tubercular and other deposits as in any other lung.

A remarkable peculiarity in this connection is the frequent absence in the middle lobe of the right lung of any great degree of congestion. This is most often seen in cases of pneumonitis. Many a case of double pneumonitis, or others where the upper and lower lobes of the right lung were involved, the left lung not being affected, has shown the middle lobe to be perfectly normal.

The pleuræ generally have a dark purplish-red color, mottled here and there with irregular bluish spots. It will sometimes happen that the external coloration of the lungs does not convey any adequate idea as to the intensity of the engorgement within. It is by no means infrequent that the necroscopist is surprised beyond measure at the intensity of the passive engorgement of the lung, after having suspected but a slight congestion from the light appearance of the outer surface.

The appearance of the heart and great vessels is hardly second to the condition of the lungs. I have invariably found the right side enormously

distended and the *ostium venosum* entirely incompetent, with its tricuspid valve, to stem the return flow from the right ventricle, thus practically throwing the right auricle and ventricle into one large auriculo-ventricular cavity. In fact, I have this day encountered a heart so dilated, in the case of an habitual drunkard, as to admit of the introduction of my whole hand, previously folded as small as possible, beyond the metacarpo-phalangeal articulations. The circumference of the right auriculo-ventricular orifice must, therefore, have been at least 18 centimetres, as the smallest measurement around my contracted hand is over 20 centimetres. This is the largest *ostium venosum* that I have ever seen in these cases. In most of the cases this opening easily admitted my four fingers and thumb as far as the middle of the proximal phalanges, *i. e.*, was about 13 centimetres in average circumference. The normal average is 10 centimetres, according to Quain readily admitting three fingers, but as fingers differ in size, this is not a very accurate test. I have also found the pulmonary artery distended with dark blood in all cases. Its orifice, as a rule, permits of the easy entrance of three fingers in these instances, *i. e.*, is about 10 centimetres in circumference. The one in the above-mentioned case of the large *ostium venosum* was fully 13 centimetres in circumference. In these cases, the pulmonary valves are always incompetent, and hence readily admit considerable regurgitation. The left heart is invariably either empty or contains but a very small quantity of blood. The pulmonary veins are also empty, or very nearly so. I have always found the whole heart relaxed. Not more than three or four of all the cases in this class that have come under my observation during the last two years presented any valvular disease.

The conditions of other organs varied greatly. The liver is usually either healthy, fatty, or in the active or passive state of chronic interstitial inflammation. The spleen may be normal or show an increase of its connective tissue. The kidneys are often either in the active or passive state of interstitial inflammation.

The principal feature in connection with the abdominal organs is their degree of sanguination. In the bodies of persons who are poorly nourished and evidently more or less anæmic, the abdominal organs are in a condition of marked exsanguination, while, on the other hand, they are gorged with very dark blood in the well nourished and plethoric. Any variety of sanguination of these organs is noticed between these two extreme conditions of the individual. The peripheral veins, however, are in all cases empty and collapsed, and in anæmic cases, even the *vena porta* and its tributaries are almost entirely devoid of blood. The capillaries are not as full as usual except in the face and neck, where they contain well carbonized blood. The cerebral veins usually contain more or less very dark blood in those who have enjoyed average health or were plethoric, but, otherwise, they are also as devoid of their usual contents as are the other veins.

Etiological data are very important factors in the treatment of disease, and therefore the consideration of the causes of these fatal congestions, though largely speculative, is fully within the boundaries of perfect propriety.

First, I have noticed that a great proportion of these fatal congestions occur in persons more or less inclined to *drunkenness*, but it is by no means limited to this class. Again and again has it occurred that some of these unfortunate beings returned home intoxicated and laid down to sleep, never to awaken. Not only do they die in their beds, but upon the floors of their rooms, in halls, streets, gutters, in boxes, station and lodging houses, upon trucks, and in short, wherever a drunken person is apt to go for rest. Secondly, that *cold* is an important factor is self-evident. It, however, is hardly a sufficient cause for these phenomena, as it often happens that the person having succumbed to one of these fatal congestions, of which I speak, has been previously afflicted with an ordinary congestion many a time, and without a bad result. Third, *exposure and privation* seem to exert as potent an influence in the production of this malady as does drunkenness. Yet, I have often seen typical cases of fatal congestion in persons having comfortable, nay, even luxurious homes, and who were total abstainers from alcoholic or malt beverages.

What, then, is the underlying cause of this affection, which can rationally be supposed to exist in all of the cases that I have seen? To my mind it seems clear that the *sine qua non* in its production is essentially a nervous influence; or, perhaps, more truly still, the absence of the normal nervous control of the pulmonary circulation. Whether this be an affection of the respiratory centre, perhaps in a state of constant irritation, exerting an inhibitory influence over the pulmonary sympathetic, or a depressed state of that section of the sympathetic which controls the pulmonary circulation, or whether it may be both, I have not sufficiently good data to enable me to rationally claim. It is, however, my opinion that this congestion is at first a blush of the lungs, occurring in the same manner as a blush of the cheek, *i. e.*, by a sudden dilatation of the capillaries, due either to an inhibitory influence of the cerebro-spinal axis, or a depression of the pulmonary sympathetic. It may be fair to assume, in the uncertain state of our knowledge upon this question, that both influences exist at the beginning; and that, while the cerebro-spinal axis returns to its normal state, the pulmonary sympathetic is permanently paralyzed, and thus the blood stagnates in the capillaries of the lungs, in consequence of the inertness of its environing channels. That in such a condition the alternate contraction and dilatation of the left auricle and ventricle, together with the aspiratory function of the thorax, would not be sufficient to prevent the stagnation of blood in the lungs, seems assured upon *a priori* reasoning, on account of the physical obstacles (as friction) encountered in the exceeding minuteness and enormous multiplicity of the

tubular network through which the circulation takes place. This *a priori* reasoning is proven to be true on the autopsy table in every one of these cases. Almost all the blood is found pent up in the *venæ cavæ*, right heart, pulmonary artery, and lungs. The pulmonary veins, left heart, arteries, systemic capillaries, and peripheral veins, are either entirely or almost devoid of their usual contents. In very full-blooded persons the venous engorgement extends back into the liver, spleen, and kidneys, and sometimes to the brain. In no other conditions, that I have ever seen, do these three abdominal organs together appear so full of black blood. In no case, no matter how full-blooded, did the venous engorgement extend beyond the cavities of the trunk and cranium.

I will here incidentally mention that, as the first stage of pneumonitis is different from an ordinary congestion of the lungs, and as these fatal congestions of which I write also differ essentially from ordinary pulmonary hyperamix, and as these fatal congestions or engorgements are very similar in appearance to the first stage of pneumonitis, the hypothesis of a nervous influence as a cause in the one is equally probable as the essential factor in the production of the other.

At first there is but slight disturbance of the equilibrium between the pulmonary and systemic circulations. Steadily, but surely, this disproportion between the two sides increases. The arterial side of the circulation is losing its blood constantly in greater amount than it is supplied from the lung by the pulmonary veins. In time the lungs become surcharged with blood. The air-chambers are diminished in size, on account of the tumefaction of the interstitial structures of the lung, by the enormous dilatation of the gorged capillaries. Hence less air enters, and the blood becomes extremely carbonized and deoxidized. All the cells of the body therefore suffer more or less true asphyxia; nor is this all, they are robbed of a share of their usual nourishment. What blood does pass to the left heart, then, is very poor in oxygen. When the lungs are saturated with blood the right heart begins to experience the pressure of the blood that is being pumped on by the poorly oxidized left ventricle, the arteries, and the capillaries. Soon the pressure becomes too much. The openings of the right ventricle begin to dilate, and their valves become incompetent to check the return flow of the current. The right ventricle forces some of its contents into the pulmonary artery and lungs, to have a share of it regurgitated a moment after. In the same way the right auricle works with only partial success; for, in consequence of the dilatation of the *ostium venosum*, the tricuspid valve is ineffectual in preventing the back-flow of blood. While, at first, the amount of regurgitation is small, it gradually increases so as to amount to more than that which enters the lungs, and eventually hardly any passes to its normal destination, and nearly all the blood simply moves up and down in a continuous column, extending from the division of the pulmonary artery

through the right ventricle and auricle into the upper and lower *venæ cavæ*. That the patient should be able to survive long with a heart in this condition is an impossibility. His exhausted heart yields in despair in a brief period unless prompt relief is afforded. Medicinal remedies are of exceedingly doubtful utility, for the very means (the circulation) by which we carry them to the parts to be affected are incompetent. Mechanical relief, therefore, is most urgently called for, but more of this later on.

The *symptomatology* of this affection is very meagre, as far as I have been able to determine in a study of the cases of which I speak. The duration is very short, probably never exceeding twenty to forty-eight hours from onset to termination; but I am inclined to fix the usual time at about six or eight hours. It occurs much oftener in males than in females, and I have never observed it in children.¹ There is frequently a sense of impending danger. In one of these cases that I have recorded I could get no further history than that the patient was a little quiet, and said to his wife, "I'm afraid I'm going to die, Annie." This impending sense is absent, however, in many cases, as far as could be ascertained. There may or may not be either unilateral or bilateral pain. An almost invariable symptom, if any at all are noted, is oppressed respiration. Thus one of my earliest cases was that of a young butcher, of average height and splendid muscular development. It had been a comparatively mild day in autumn and he had carelessly exposed himself to the sudden fall of temperature occurring during the latter part of the afternoon. When he arrived home in the evening, about 9 o'clock, he first began to feel uncomfortable. He said that he felt chilled to the bone, and could not get warm; that breathing was rather difficult and *unsatisfactory*; and repeatedly, in the midst of joyful surroundings, expressed the conviction that he might never leave his bed alive after having entered it that night. A strong mustard plaster was applied to his chest by one of his relatives, and his feet were bathed in hot mustard-water. Then he went to bed. In the morning his body was lifeless and cold, the latter fact proving that he must have been dead for some hours. He went to bed after 11 P. M., and his room was entered before 5 o'clock the next morning. Thus he must have died within two, or at most three, hours after retiring. The autopsy was made about fourteen hours after death. He had the blackest lungs I have ever seen, for they looked like tar. His left heart and arteries, as well as the pulmonary veins, were empty, while the right heart was enormously distended with black blood, as were also the pulmonary artery and the *venæ cavæ*. His liver, spleen, and kidneys were in a state of the most intense venous congestion. The *vena porta* contained a little blood. The

¹ The case of a child I saw a short time ago seems to have been one of this class. It was but a few weeks of age, and had been poorly fed and exposed to the weather.

cerebral veins were almost empty. All the peripheral veins were collapsed and bloodless. And this state of affairs prevailed in a very full-blooded young man. The spinal cord was examined, but presented nothing abnormal.

A feeling of weariness is also occasionally complained of.

While dying, the face and neck very slowly become livid, but not as much so as in death from asphyxia. Death, when it has been observed by intelligent lay persons, was said to have occurred without a struggle, and in a moment.

In one case, a tall, stout, and full-blooded young man, twenty-eight years of age, was chatting with his family. Talking became more and more difficult, until it was considered advisable to send for a physician, but this was postponed. The symptoms increased in severity till continuous talking became very difficult, when he suddenly reeled off his chair with a look of fear and perplexity, and was dead. His brain was examined and found normal, and the only signs to account for the sudden loss of life were discovered in the heart and lungs, which presented the appearances described in the preceding cases.

The symptoms, then, are briefly all those of a severe cold, minus the cough, although that is also present at times. The most marked symptoms, very often, are the oppression of breathing and the sense of impending death. Upon the dead body, percussion discovers marked dulness over all parts of the chest, and as all parts of the lung crepitate in most of these cases, a diminished respiratory sound, associated with moist rales, would most likely be announced by *ante-mortem* auscultation.

The *treatment* of this affection should be *prompt, decisive, and radical*. It is not fair to the patient to attempt the use of doubtful means. If any measure is already at hand which promises relief as soon as applied, that is the one to be used. Should no such remedy exist, it is perfectly just to devise some *radical* plan, which, if pursued, will *most likely* eventuate in the recovery of the threatened sufferer. Just the means that are here indicated have been devised and practised by my friend, Dr. Benjamin F. Westbrook, of Brooklyn, N. Y., *i. e.*, the operation of cardicentesis, or aspiration of the heart.¹ Even this remedial measure, prompt as it acts, must be quickly applied. No time is to be lost, as every minute may count.

I have detailed one case in which strong counter-irritation had been applied to the thoracic walls and the feet without avail. This is by no means the only one on my list. Others have been similarly treated, previous to death, with the like result. The immediate danger is not from asphyxia, but from heart failure, due to over-distension of the right side, and gross

¹ See paper by Dr. Benjamin F. Westbrook, entitled "On Abstraction of Blood from the Right Heart, as a means of relieving intense Pulmonary Congestions," in the *Medical Record* of December 23, 1882.

incompetence of the valves guarding the two orifices of the right ventricle. Relief, and the promptest kind too, must be tendered this organ, in preference to any other. Thus, there can be no doubt of the utility of the abstraction of enough blood from the right heart to allow it to regain its normal functional activity.

As is the fate of all innovations, however, whether good or bad, so it was that of Dr. Westbrook's operation to meet with opposition, and that of a decided character. It is also damaging to the interests of our profession that original thought should be opposed by iconoclastic criticism, as too frequently happens, and has occurred in connection with the operation of cardicentesis. Let me beg of all critics to maintain that imperturbability of true impartial scientific criticism, and I will aver that their opinions will receive more respectful attention from those for whom they are meant than would result from any other course.

With reference to a rather harsh editorial appearing in the *Medical News* of February 3, 1883, I will say but a few words: First, to the question as to what it matters if the great venous trunks are perforated, there are two answers: one, that it matters *not*; the other, even if it did, they could never be perforated except by a careless or bungling operator. There is much less chance of touching the venous trunks in this operation than there is of cutting the brachial artery or median or musculo-cutaneous nerves in phlebotomy anterior to the elbow-joint. Second, it is *not true* that "when a needle is inserted the movements of the heart must widen the orifice made." *A priori* reasoning would, in the first place, refute this on account of the elasticity of the auricular walls and their fluid contents. This is proved *de facto*, as no mark could be found upon any part of the auricle operated upon by Dr. Westbrook to indicate the point of entrance of the needle.

Two writers in the *Medical Record* of January 20, 1883, Dr. Hal. C. Wyman, of Detroit, Mich., and Dr. Wm. T. Cheesman, of Auburn, N. Y., file their opinion against the operation of cardicentesis. The former, however, tends to become sarcastic and jocose toward the end of his letter. It is hard to conceive how the cardiac valve might ever be "stitched up," but that divulsion of the cardiac orifices is much more plausible can readily be seen. I have long ago deemed divulsion of these openings a practicable operative procedure, and should not hesitate to have it done upon myself in case of stenosis of one of my own cardiac orifices. Lack of thorough anatomical knowledge makes even bold surgeons timid at times, and this is a fact that was fully appreciated by Prof. Billroth, when he exhorted his students to thoroughly master anatomy.¹

Dr. Cheesman asks if it is not an unhappy result to have even the

¹ "Anatomy, gentlemen! Anatomy, and again Anatomy! A human life often hangs on the certainty of your knowledge in this branch."

slightest hæmo-pericardium follow the operation of aspirating the right auricle? I say *no*. If it is not success to save human life, although at the expense of even considerable outpouring of blood into the pericardium, rather than keep the pericardium clear at the expense of the patient's life, then no operation is successful. We cut off both lower extremities to save life, and if this object is attained, we speak of it as a successful operation. If we save life by cardiac aspiration, though at the expense of effusing an ounce of blood into the pericardium, it is a complete success, for the blood is easily absorbed, while we promptly deliver a human being from imminent death, and leave him as well as he was before his trouble set in. How different is this from keeping him here minus two lower limbs. And yet the former should be a failure and the latter a success! He further says: "Bearing in mind the tenuity of the auricular wall, and the danger that it shall tear itself by motion against the needle (not a fanciful danger by any means), can we consider its puncture any other than a most hazardous expedient?" It is true that the auricular wall is tenuous, but it must also be borne in mind that it is elastic and contractile. No better practical demonstration could be asked for by the most exacting than resulted in the *post-mortem* examination of Dr. Westbrook's case. As was said once before, it was impossible to find any sign upon the wall of the auricle that might indicate the place of entrance of his needle. The doctor also states that he has known cardicentesis to have been resorted to in cases of immediate danger from heart failure, but he does not tell us how often, by whom, where, or when, nor with what success. Will he please publish an account of the cases he knows of, for they might prove valuable? His questions will be answered later on.

Dr. C. L. Dana reports two cases of cardicentesis in the *Medical Record* of February 3, 1883. In both, aspiration was practised after somatic death, but probably previous to complete cellular death. Half an ounce of blood was withdrawn from the first case without any effect. That is a result that I should have anticipated, and would doubt the success of the operation of restoring life if even several ounces had been abstracted, unless death had resulted primarily from heart failure, and even then other means would have to be resorted to for the purpose of starting the circulation. The operation was designed for the relief of the heart laboring under physical difficulties, and especially without organic lesions, and not to awaken its vitality once it had ceased to beat. In one case the puncture made by the needle in entering the heart was distinctly seen at the autopsy. It is proper to bear in mind, though, that the operation was performed upon the dead body. The first case cannot count on either side of this question, but is valuable in showing that the advantages of this operation had been previously appreciated to a certain extent. In the second case, the heart continued in action some time after respiration had stopped. He does not say whether he abstracted blood from the

right ventricle while the heart was in action or after. So this case, too, as it now stands, is of no value in settling the doubt in the minds of those who would like to see more proof either way.¹

The value of cardicentesis over venesection consists in its being *simpler* and requiring paraphernalia less disheartening to the patient, being more prompt in its effect, necessitating less loss of blood, and that its performance is always possible, while in some cases the abstraction of sufficient blood by phlebotomy is not only impossible, but sure to hasten death. Simplicity is always desirable, and what can be a more simple operative procedure than the thrusting of a needle into the chest, especially as it causes no more inconvenience than the much-used, valuable hypodermic syringe?

Promptness is a great desideratum in all operations, whether the patient is under the influence of an anæsthetic or not, and this is particularly the case in instances in which the heart threatens to give out at any moment on account of physical impediments. If to this item of promptness the fact can be annexed that in this operation the same effect can be produced by the loss of less blood than is the case in phlebotomy under similar circumstances, another point in its favor is gained, and such is actually the fact.

There is one more point in favor of cardicentesis, and it is a weighty one. It is the fact that this operation is always possible and effectual, while phlebotomy is not, Dr. C. L. Dana to the contrary notwithstanding, for he says: "In cases of laboring heart I should vastly prefer venesection, whose potency is unquestionable."

It is certainly true, as has been remarked to me, that if one end of a tube is placed in a volume of water, while suction is made at the other extremity with the mouth, water will flow through the tube till suction is arrested. Furthermore, it will keep on flowing if the end of the tube to which suction has been applied be placed lower than the level of the volume of water from which that is derived which passes through the tube. This is on the principle of the siphon. Both may be combined with in-

¹ On page 820 of the March number of the *Edinburgh Medical Journal* for this year, is a brief account, by a gentleman signing himself "An Asylum Assistant," of a case of probable transfixion of the lower part of the heart with a three and a half inch needle, or shawl-pin, for suicidal purposes. The symptoms were apparently alarming, but subsided upon the withdrawal of the offending body to reappear for a short time in several hours; after this complete recovery followed. The reporter of this case considered the patient to have had a narrow escape, and no doubt she had, but it is inexplicable to me how he justified his opinion in viewing this case as proving the operation of "cardicentesis out of the range of practical surgery," for the very fact of her rapid and complete recovery following almost immediately upon the extraction of the needle goes to show that whatever danger there may be (and I doubt that there is any at all), is obliterated by the removal of the cause which excites it. I cannot help viewing this gentleman's case as one to prove cardicentesis practicable, and it seems to me that so will he upon further deliberation.

creased effect. This proposition has been presented in favor of phlebotomy as against cardiacentesis. But the pulmonary circulation is not conducted on the principle of the siphon, so this must be eliminated. The blood is propelled from the right heart through the lungs to the left heart by several forces. The *vis a tergo* of the columns of blood in the systemic venous trunks pushed along by the systemic capillaries; the alternate contractions and relaxations of the veins from compressions due to flexions and extensions caused by muscular action; the effect of muscular contractions on the blood within the muscles and between them; and the contractions of the veins themselves, though slight; all these tend to push the blood forward to the right heart. The other forces, consisting in the comparatively passive dilatation of the left heart in response to the blood pressure from behind, which is caused by the compression of the lungs and their contained bloodvessels in expiration; and the capillary attraction and contraction itself are the ones that send the current to the left heart.

The dilatation of the left heart is not a *vis a fronte*, as is so often stated. Were radiating fibres attached to the ventricular walls so as to draw them out, and tend thus to create a vacuum in the general left auriculo-ventricular cavity, it would necessarily be an active force, drawing the blood into these cavities as a so-called suction-pump "draws" water. This, however, is not so, for the left heart dilates only passively in obedience to the inpouring of blood from the lungs.

The aspiratory function of the thorax also does not act as a propelling force to the arterial side of the lesser circulation. Whatever blood it does "suck" into the thoracic cavity is by way of the ascending and descending *venæ cavæ*. It tends to draw both air and blood into the lungs, but only succeeds in attracting that blood which comes from the peripheral venous system to the right heart and lungs, while on the other hand, it *retards* the circulation through the pulmonary veins *from* the lungs, for to these latter organs all the blood now tends that can go that way.¹ There is no impediment in its course on the venous side from the furthestmost systemic capillaries, while on the arterial side there is a very effectual barrier to any back flow not far from the lungs, consisting in the bicuspid valve. The aspiratory function of the thorax can, therefore, have no effect in filling the left heart, because the bicuspid valve effectually prevents aspiratory attraction of the arterial column beyond it by inspiration.

¹ The aspiratory effect of inspiration upon the heart has been fully considered, but not incorporated in the body of the paper, because the aspiratory effect upon the lungs preponderates over that exercised upon the left ventricle, which is opposed to them. In inspiration, the lungs tend to attract blood from the pulmonary veins and left auricle, while the left auricle and ventricle oppose it. The effect is a flowing of the current in this direction during inspiration. This mechanism seems so simple that I think it unnecessary to enter into further details, as it must be evident to all upon slight consideration.

During inspiration the blood tends *to* the lungs, as well as the air, from all possible directions. Its effect is most positively felt by that column of blood naturally coursing towards these organs, *i. e.*, the pulmono-systemic venous column. The valves in the veins, the tricuspid, and the pulmonary open toward the heart and lungs, and therefore offer no obstruction to the increased flow in this direction. The opposite prevails, though, in the other (arterial) column. Here the attraction is contrary to the current, which tends from the lungs. The bicuspid and aortic valves open from the lungs and close to prevent regurgitation to the organs whence the current came. Thus, during inspiration, the venous flow is accelerated and the arterial retarded. In expiration it is contrariwise. Here the lungs and thoracic parietes contract, causing a tendency to *expel* air and blood in all possible directions. The blood current now is *from* the lungs. It is contrary to the venous column and against the pulmonary and tricuspid valves and the valves of the veins, which prevent regurgitation during the diastole and period of cardiac rest when expiration is in progress. The direction of the current, though, is now *with* the arterial column, and *its* flow is *accelerated* through the pulmonary veins and left heart, the bicuspid and aortic valves now offering no resistance.

As is well known, the heart beats about four times during one respiratory act. Inspiration is active and a little longer than expiration, which is passive. The former aids the venous column which passes through the vessels that are larger, thinner, weaker, and less elastic than the arteries, and through the weaker side of the heart; the latter assists in propelling the blood along the left heart and arteries, which are in themselves much better adapted to carry on the circulation than the veins and right heart. The lungs, therefore, give more aid to the venous and weaker circulation than they do to the stronger arterial. The pulmonary circulation then may be viewed as follows: The right heart pumps blood into the pulmonary artery and its branches until they are well distended; inspiration takes place and draws the blood from the pulmonary artery into the pulmonary capillaries and at the same time attracts the blood from the large venous trunks into and close up to the right heart; expiration then forces the blood from the capillaries through the pulmonary veins into the left heart. These three steps might be designated in their order as first, that of *venous distension*; second, that of *capillary distension*; third, that of *arterial distension*. The circulation thus passes through the lungs in a series of three stages during every respiration.¹

Thus there is normally every provision for a perfect and ever moving circulation through the respiratory organs. No better arrangement could

¹ It is a well-established fact, to my mind, that the perfection of the pulmonary circulation depends upon the character of the respiration. I have many a time verified by *post-mortem* examination the fact that the lungs are in a state of passive congestion just in proportion to their defective *ante-mortem* respiratory activity.

have been invented by a skilled engineer to prevent any improper working of this mechanism. The nervous systems control the contractile power of the pulmonary vessels and thus exert the same influence upon the circulating fluid passing through the lungs that the brakeman on a railway car exercises on the speed of the train by the judicious manipulation of his brake. Should, now, this lesser or pulmonary circulation become deranged at any time, it is very evident that one or more of the forces controlling it must have been primarily at fault. It must, therefore, exist either in the right heart, the lungs, or the left heart. In all these cases that I have considered, and for the alleviation of which Dr. B. F. Westbrook devised his operation, the fault did not lie in the right heart primarily, nor did it exist in the left heart; necessarily then, this first fault existed in the lungs. To determine what the exact cause was here, is rather difficult, but let us see.

Respiration is not modified in these cases except very late in the disease and then only as a consequence of the deranged state of the pulmonary circulation. The contractility of the capillaries and smaller vessels in the lungs is the only factor in the maintenance of the pulmonary circulation left us that may be at fault. This we cannot exclude, and it is the only one that it is impossible to cast aside. That those little vessels should have taken it upon themselves to suddenly and in concert refuse to contract as was their usual habit, is not a rational inference. Some higher power must have directed them, and this power is beyond a doubt located in either the medulla, or the pulmonary sympathetic, or both. The brakeman is at fault. The fact, however, remains the same, *i. e.*, that the original trouble was pulmonary and very likely began in the nervous system, and if the arterial side of the circulation was not able to *prevent* this difficulty, it certainly is powerless to *check* it afterward. This becomes still more evident when it is recollected that the arterial side of the circulation is gradually diminishing in vigor by slowly, but steadily and surely, losing its blood, and that blood is over-crowding the intra-thoracic venous system. Eventually the peripheral veins become empty and nearly all the blood has retreated to the lungs, the right heart, and its two great feeders.

While it is universally conceded that the abstraction of blood is in these cases the best remedy, the general impression is that simple venesection at the elbow is efficient and safe, while cardicentesis is dangerous and inadmissible. Let it be remembered, though, that the peripheral veins are almost entirely devoid of blood. The only direction from which blood can be drawn is from the arterial side through the capillaries, for the veins have valves, and being almost entirely empty no blood can be obtained from the right heart and lungs except in the most roundabout manner, *i. e.*, through the systemic venules, capillaries, arterioles, and arteries, the left heart and pulmonary veins, capillaries and artery.

Should arteriotomy be attempted as a more direct means of getting the blood from that side of the circulation, as it must come from there anyway if cardicentesis is not performed, the end of the patient would only be hastened by depletion of the arteries in a shorter time than nature is doing it herself. For as the heart has not aspiratory power, the loss will not be made up by sufficient outpouring of blood from the lungs through the pulmonary veins in response to the sudden depletion of the vessels. By going to the auricle, though, we get ahead of the valves in the veins, go at once to the seat of the trouble, abstract blood directly from the parts overloaded with it, and give immediate relief without depleting the arteries.

Dr. John B. Roberts¹ cites two cases of accidental heart puncture resulting beneficially to the patients. In one, that of Roger, "200 grms. of pure venous blood" were withdrawn from the heart. He further says: "Death occurred five months later from long existing dilatation and valvular disease of the heart." In the other, Hulke's case, 4 grms. of venous blood were also withdrawn, and "she died four weeks later from a complication of diseases, and the autopsy revealed cardiac dilatation and valvular changes." He further adds in reference to this case by quoting from a previous paper of his, as follows: "The abstraction of the blood seemed to relieve the distended heart much better than phlebotomy would have done, as was evinced by the diminution of threatening symptoms and the decrease of the area of dulness." Additional references are given in support of the claim of the absolute harmlessness of cardicentesis.

In referring to Dr. B. F. Westbrook's point of selection for the introduction of the needle,² Dr. Roberts is inclined to prefer entering the right ventricle "through the fourth interspace, about one and a half or two inches to the *left* of the median line of the sternum." He, however, yields the point of deference in Dr. Westbrook's favor.

In listening to Dr. Roberts when he read his paper on "The Surgery of the Pericardium" before the Anatomical and Surgical Society of Brooklyn, N. Y., in 1881, I heartily endorsed all he said, and at that time was convinced that divulsion of the cardiac orifices in case of stenosis would be a safe and practicable operation.

I have previously said that Dr. Westbrook's single operation of cardicentesis was successful. I reiterate that statement. Here is what he says in his report of the case: "As I was anxious, however, to avoid any possible risk of increasing the peril of *any* patient, I chose for the subject of the operation, which I am about to describe, a case *in*

¹ See a paper by Dr. John B. Roberts on "Heart-puncture and Heart Suture as Therapeutic Procedures," read before the College of Physicians of Philadelphia, January 3, 1883, and appearing in the *Medical News* of January 13, 1883.

² In the right third intercostal space close to the sternal border.

which all chance of recovery had disappeared."¹ The first attempt was a failure, inasmuch as the needle penetrated the aorta, and the operation was abandoned, although the needle had been taken from the aorta and placed in the auricle. Later on it was tried again as a last resort, and about 100 grms. of fluid blood were withdrawn. The patient was more comfortable as a result, and expressed himself as feeling much better. The doctor had only hoped for palliation in this case, he obtained it, thus far he was successful. If a man accomplishes what he desires to do, he is undoubtedly successful. I, too, believe with him that had the operation been performed sooner, and had there been much more blood abstracted (probably 300 grms.), complete recovery might have followed.

In the proceedings of the Brooklyn Pathological Society² will be noticed a case reported by Dr. B. F. Westbrook, in which he says his operation would have done undoubted good had it been performed. Replying to several inquiries he further expresses himself on this subject. I quote the whole paragraph :—

"In reply to questions from Dr. Wunderlich, Dr. Wallace, and others, Dr. W. stated that bleeding from the peripheral veins was not at all equivalent to direct abstraction of blood from the right heart. On such desperate cases as those for the relief of which he advised this procedure, the blood is found accumulated in the great veins of the trunk and head. The arteries were poorly filled, and the peripheral veins almost empty. Though blood could, of course, be abstracted from them, it would not run backward from the great veins themselves, owing to the valves, but would have to come around through the poorly-filled arterial system, and the flow would be so slow that collateral channels would serve to undo most of the good that was being done; and before any appreciable effect could be exerted upon the right heart, all the blood that would flow would have been abstracted. What was necessary in such a desperate case was to rapidly diminish the flow of blood into the right ventricle, in order to allow it to empty itself and regain its equilibrium. He thought the danger in puncturing the heart was greatly overestimated. The heart is, in reality, the toughest, most long-enduring organ in the body, and, unless it were clumsily done, such an operation as he advised would do no harm. He also wished to call attention to the fact that he only advised it in desperate cases, where there was no hope of relief from other less radical measures."

I wish to take exception to but one thing in the above quotation, and that is the last expression. There is no reason to my mind why this operation should be a "*dernier ressort*" to be used *in extremis*. I wish to recommend, as I understand Dr. Roberts intends, that if this operation is to be done at all, it should be done as early as possible. We have every inferential reason to believe that it is *harmless*, and whatever practical knowledge there is on the subject only tends to justify the inference that it is devoid of danger.

The lack of a thorough knowledge and of a perfect acquaintance with physiological and pathological rules and processes makes the majority of

¹ Italics my own.

² Published in the "Proceedings of the Medical Society of the County of Kings" for Oct. 1883.

the members of our profession timid. It is altogether inexplicable to me, after a careful study of this subject, how it can be that this simple operative procedure has been so strongly objected to, unless the objections are based entirely on erroneous conclusions resulting from a defective consideration of this question. My closing sentiment is to let the anatomist, pathologist, and surgeon persevere and conquer, that he may prove to his stationary brethren that the end of possibilities is as yet afar off!

ARTICLE VII.

CASE OF DERMATITIS HERPETIFORMIS CAUSED BY NERVOUS SHOCK. By LOUIS A. DUHRING, M.D., Professor of Skin Diseases in the University of Pennsylvania.

IN November, 1878, I was asked by my friend, the late Dr. F. F. Maury, to see a "curious case of bullous skin disease" under his care. It proved to be a marked example of what I have described as dermatitis herpetiformis.¹ The following notes, which I think worthy of record, were made at the time. The disease was then fully expressed, and showed the lesions not only in abundance but in all stages of development.

The patient (Capt. K—) is a man thirty-four years of age, of large frame, stout and strong, and in the enjoyment of good general health. He never experienced any disease of the skin until six weeks ago, when the present eruption made its appearance. There is no family history worthy of record.

While gunning in the meadows, he unexpectedly found himself in a bog of soft, blackish, strong-smelling earth, into which he sank deeper with every step. He at once recognized the nature of the spot and the danger, and endeavored to extricate himself, but this proved no easy matter, for with every step he sank deeper into the mire, until in a short time he was buried up to his armpits. He realized his extreme danger, and looked forward to a speedy and miserable death. After struggling for a full half hour in the above predicament he succeeded in seizing a tuft of grass just within reach. By gradually working himself loose and pulling on the grass he finally, in an exhausted state, managed to reach firm ground. He was carried home in a weak condition, bathed and cared for. Three days after this adventure, which had greatly shocked his whole system, the eruption appeared in the form of small, variously shaped, round, oval and angular vesicles, or small "blisters containing clear fluid."

They came out in number, and were scattered over the flexor surfaces of arms and forearms. When first noticed they were pin-head in size, and were not accompanied by areolæ, but seemed to rise directly from

¹ Communication read before the Section on Medicine of the American Medical Association, May 6, 1884. Journal of the Am. Med. Assoc., Aug. 30, 1884. See, also, AMER. JOURN. OF MED. SCI., Oct. 1884.

the sound skin ; two days later, however, inflammation surrounded their bases. At first they were free of itching, but towards the fourth or fifth day, by which time they had slowly grown to the size of peas, this symptom set in violently. On the second day of the attack scattered lesions of the same character appeared here and there over the trunk, legs, and thighs, and were especially numerous on the posterior surfaces of the thighs, over the shins, and about the ankles, and were quite symmetrically distributed. On the trunk they were on the back, chiefly between the scapulæ, and on the abdomen about the umbilicus and pubes. On the chest they were few in number and disseminated.

By the fifth or six day they had attained the size of large peas—in short became *blebs*; were tensely distended with clear, serous contents; showed no disposition to rupture; and were accompanied with slight areolæ. The itching now became annoying and was constant, the desire to scratch being uncontrollable. The general health remained good; no chilliness or fever. About this date he was rubbed with olive oil, which aggravated his condition, the skin by the next day becoming hot and more irritable. New lesions continued to appear, especially on the back, and the older ones increased in size without showing any sign of rupturing, and where two or more were in close proximity they often coalesced.

From the sixth to the thirteenth day he had no rest, the itching being of the most harassing character. About the eleventh day the lesions became darker, the contents showing a distinct orange-yellow color, and instead of being serous in character were thicker and of a “jelly-like” consistence, so that when the blebs opened with a knife the mass could be removed as a semi-solid gelatinous substance. On the fourteenth day the skin generally and the lesions assumed a dark-reddish, bluish-red color, while the latter contracted and in a few days became crusted and hard, so that with his finger he could “knock them off,” a dark-reddish stain remaining. The eruption at this date was at its height. The blebs were very numerous, the whole surface being literally covered. The scalp, face, ears, penis and scrotum, and even the verge of the anus, were attacked, the palms and soles being the only regions that escaped. The mouth was likewise unaffected. The lesions varied in size from a pea to a walnut, the average size being that of a silver dime; the larger ones were generally formed by the coalition of two or more lesions. They were semi-globular in shape, tensely distended, and in no instance flattened or umbilicated. None burst spontaneously, but many were ruptured by violence; they invariably burst with “a crack” or “explosion.” As already stated, crusting took place in the course of a few days, the crust being of a yellowish-brown or dark-brown color, and not bulky. After these became detached, he observed about the bases of the original lesions a few small pin-head sized “whitish points” or pustules, which multiplied and grew rapidly, itched, and burned; were raised; ran together in many instances; and in four or five days developed into large yellowish *pustules*, some of them being as large as cherries. Nearly all of these lesions, hundreds in number, were punctured, the walls collapsing and the contents flowing freely but being somewhat turbid. This outbreak constitutes what he terms the second attack. The lesions were as abundant as in the first attack, and while showing a disposition to appear on the sites of the old lesions yet came out also on sound skin. Poultices were applied, and later crusts formed as before, which in the course of a few days became detached, leaving dark-reddish spots and stains.

He now rapidly recovered and remained nearly well for a week, when the third attack set in. This was ushered in by malaise, chills, heat, nervousness, and a general itching of the surface, the eruption developing much more rapidly than before. The lesions were for the most part distinctly *pustular* in character, the others being *vesico-pustular*, *vesicular* and *bullous*; were flat, surrounded with inflammatory areolæ, and itchy. They appeared only on the extremities and over the abdomen. They differed in their distribution from the former lesions in being *grouped*, two, three or more manifesting themselves in close proximity, often coalescing.

Present Condition.—November 22, 1878. He is now suffering with the remains of the third attack, just described, to which within the week has been added a fourth outbreak. New lesions have been coming out from day to day. He is confined to bed, and is suffering with a profuse multiform eruption occupying the greater portion of the general surface. It consists of *vesicles*, *blebs*, *vesico-pustules*, and *pustules* of various sizes and shapes, and in all stages of evolution; *erythematous* (light and dark red) *patches* and *stains*, for the most part the remains of former lesions; *excoriations* and *scratch-marks*, and *crusts*, though these latter lesions are by no means abundant. The multiformity of the lesions is striking. Vesicles, blebs, and pustules are in about equal proportion, and are so intermingled as to exist side by side. The vesicles and blebs may be first considered, and I speak of them together for it is impossible to draw a line of distinction between them; the difference is merely of size. They exist in large numbers, in hundreds. They vary in size from a pin-head to a walnut and larger, the majority averaging between a split pea and a hazel-nut. They are semi-globular or flat in form, and are either tensely distended or flaccid, the former condition existing in all of the smaller lesions. They rise abruptly from the surrounding skin to the height of from one to several lines, have moderately thick walls, similar to the lesions of pemphigus, and show no disposition to rupture spontaneously. There is no sign of umbilication. They are of all shapes, the majority being circular or ovalish; but some are irregular in outline and show angular, "puckered" borders, as is often seen in herpes zoster, in which event they are usually surrounded with bright-red, highly inflammatory areolæ. Many of the vesicles and blebs rise up without areolæ, looking like magnified sudamina. They have a pearly or pale-yellowish color, and, as in the case of other similar lesions, refract light, which gives them a glistening appearance. The contents are for the most part clear, but some are cloudy and in many instances are more or less tinged with blood, producing a mottled or streaked bluish-red hemorrhagic look.

The pustules are likewise in all stages of evolution both as to size and extent of pustulation. Some are distinct pustules no larger than pin-heads, flat or semi-globular in form, and circular or irregular in outline; while others of the same size and larger have evidently been vesicles and blebs, and are passing into pustules. Still others are the size of peas and cherries and are distinctly pustular, like the lesions of true simple impetigo, and contain whitish pale-yellowish puriform contents. Some are in a perfect state of preservation, semi-globular or acuminate in form; others are more or less collapsed. As stated, inflammatory areolæ surround almost all of the larger pustules.

As regards distribution, no region is free except the palms of the hands. It is a very general eruption, the lower extremities exhibiting the most

lesions. The flexor surfaces are especially invaded. Upon the thighs and legs there is not a square inch that is not the seat of disease. The skin which is not occupied by distinct lesions is dark red and violaceous in color. The ankles are literally encircled with blebs and pustules, many of which have run together forming large, elongate, flaccid, partly bloody, dependent blebs. There is everywhere a tendency for the lesions to group, and while owing to their great multitude this is not striking in all regions, it is nevertheless very manifest in certain localities, as on the buttocks and thighs. The groups are for the most part small, consisting of from three to five lesions situated within a radius of an inch. In other places a dozen or more lesions occupy an area the size of the palm of the hand.

A peculiarity of the lesions is their disposition to coalesce. Inclining to manifest themselves in ill-defined clusters of two, three or more, as they increase in size they run together, forming larger lesions. Around the immediate circumference of these lesions, whether vesicular or pustular, smaller, flat pustules or vesicles, the size of pin-heads, are in many instances present. When ruptured the lesions crust over with flat, light, yellowish crusts. Removing these, superficially excoriated, moist, reddish surfaces, having sharply defined irregular vesicular or pustular borders are exposed to view. Everywhere about the older lesions there is noted a disposition on the part of the process to extend itself in a creeping manner while healing in the centre. Itching is present, and is very distressing.

Dec. 19. A month has elapsed since the last note. During this period four distinct attacks or crops of eruption have manifested themselves. The lesions in the first three attacks were of the same character as those in the outbreak of November 22d, just described at length, namely, vesicles, blebs and pustules, with but little inclination to intermediate forms, while in the present eruption *vesico-pustules* predominate. The last two attacks have been milder, with smaller lesions, but accompanied with more itching. The general course of the disease, the disposition of the lesions to cluster, and the regions invaded, have been the same as on previous occasions. At present the eruption is characterized by many small, and some large, variously shaped, *vesicles*, *vesico-pustules* and *pustules*, occurring in patches or scattered over the surface, in all stages of evolution, together with numerous excoriations, ruptured or torn lesions, crusts and scales seated upon a dark-red, violaceous, mottled, pigmented skin, the remains of former attacks. The patient is able to be about the house; his general health is good. He has used lately alkaline tarry lotions. Arsenious acid, in doses of one-fortieth of a grain, has also been taken for the last three weeks; also quinia, and a general tonic treatment.

In December, 1882 (four years after the last note), I received a note from the patient, stating "I am still troubled with the disease, and it has not failed to put in an appearance at certain periods since you saw me in 1878, although the blisters and pustules have gradually become less, both in number and in size. At certain times since, within the year, I was so free of eruption that at one time I thought surely I was rid of my pest. I can always tell two or three days before the eruption will appear by the coming on of an itching sensation. During the past six months I have had two attacks."

The history of this case, including the cause of the disease—a violent shock to the nervous system, is both interesting and instructive. The

bullous variety predominated, and when I first saw him, it was highly developed; subsequently, however (as in almost every case that I have encountered), other lesions, especially pustules, manifested themselves. The constitutional symptoms accompanying one exacerbation were marked.

ARTICLE VIII.

A CORRELATION THEORY OF COLOR-PERCEPTION.¹ By CHARLES A. OLIVER, A.M., M.D., one of the Ophthalmic and Aural Surgeons to St. Mary's Hospital, Philadelphia.

FOR some time past the author's attention has been directed towards the many conflicting and opposing theories of color-perception, some so filled with falsities and absurdities as to render them ridiculous, and others so veiled with useless perplexities as to maim and alter their intended significance. Whilst he is fully cognizant of the fact that he is but adding to the already overfilled list, he does not hope for indulgence if he be in error, nor does he apologize for anything that he may say. Individual firm convictions are presented in the knowledge that the only way for theory to become a law, is, that each shall contribute his mite of truth even though it be buried in a mass of rubbish. Taking for granted that the Huygenian or undulatory hypothesis of the imponderables is accepted, and that a difference in the number of vibrations makes a change in natural result, it must be self-evident that there can be given three positive assertions. First. That, as these actions are perceived, there must be organs able to appreciate them. Second. That each series of organs must have an apparatus able to respond to the quality of its perceived impression. Third. That as all natural imponderable stimuli are the resultants of a mere difference in the number of vibrations of one and the same ether, the organs for the receipt of the different varieties must be but analogues and modifications of each other.

Starting with the idea that each sensory organ is so adapted as to be able to receive its variety of impression, the assertion that there is a correlation in structure and action is arrived at.² This cannot be denied. Take the lowest sensation of animation, touch, and endeavor to compare it with the highest, sight. The tactile sense is seen in simplest protoplasmic mass, and it alone enables this primary form of living mechanism to exist. There has been given a quality to receive one of the simplest

¹ This theory was brought forward in a preliminary note published in the *Philadelphia Medical Times* for June 28, 1884. The present writing is the discussion of the subject *in extenso*.

² It is not necessary to discuss the first two assertions.

impressions of natural force, an actual contact with a resultant action. What is the visual sense in man, the highest creation, but a complex mass of simple elements, an engine capable of receiving many more impressions from the imponderables. What is vision but the result of an exalted character of contact¹ upon a physical difference so arranged as to be adjusted to the receipt of undulations equivalent to those of light! The physical tactile apparatus does not differ in any way from the physical color apparatus except in its form; the latter a more highly constructed variety of the former, each being adapted for its kind of stimulus. Of course every grade of animal life has its percentage of sensory power dependent upon the special development of the individual. The rate of increase being not only in the number of senses, but also in the evolution of an individual form. This is well exemplified by the sharp sight of some birds, the quickness of hearing, and the keenness of smell of some animals.

There cannot be any doubt of the fact that the special sensory portion of the organ of sight is intended wholly and solely for the determination of color. The thought that the sense of light constitutes the only visual factor of many of the lower grades of animal life, and that it must have been the primary form in the evolution of the now existent human visual sense, is, strictly speaking, incorrect. Natural colors are the exponents of a series of undulations of waves of light existing between two determinate ratios. Colorless light is the complete synthesis of such color vibrations. The more numerous the color combinations, the purer the light; the purer the light, the less colored it is; the less colored, the less visible. Pure light is invisible. Light to be seen must be colored, it must be impure. Consequently visual perception is of color and not of light, of which color there may be thousands of intensities of a single character of vibration from a dull reflection of a given natural red to the most intense reflection of the same natural red. All visual apparatuses, from the very simplest to the most complex, receive impressions of varying intensities of color. The simplest form of visual apparatus has probably but a few differentiations of impure light under its command. Thus in the epidermal eye spots of the most rudimentary types of animal existence, where resident nerve energies have been lifted from the sensation of varieties of heat vibrations into varieties of light vibrations, the impressions are limited to a few of the varying intensities of impure, colored solar beams. As the scale of life force is ascended, the numbers of received impressions increase, dependent not only upon acquired powers during the life of the animal, but upon the direct result of hereditary transmission of more highly developed physical structures capable of finer and more complex action. This continues in an interchangeable and

¹ The so-called "indirect."

irregular ascent until the acme is probably reached in some of the carnivorous types of tropical birds.

When the human visual apparatus is first placed in the world, and is exposed to color waves, it has nerve structures and material, which although never having seen the component colors of impure light, are physically fitted to respond to many of its vibrations, just as the leg, though never having acted, has its definite parts, such as the supporting bones, the propelling muscles, the governing nerves, and the supplying vessels, each in readiness for immediate action. The first moment that a beam of colored light is focused upon a sentient point of an infant's organ of sight, there is a transformation of the impinged natural stimulus into an equivalent nerve-energy which is transmitted to a cell, or plants a new cell in that infant's cerebral cortex, thus giving the receiving, transmitting, and recording cells each a new quality. A second impression is similarly received, a third, and a fourth, each stamping the working machinery with its representative mark. Repetition upon repetition of this occurs in all of the available responsive nerve materials, each single cell adding its mite, each mite strengthening and giving greater power to the organism, and each organism capable of perceiving as many colors as it holds under its jurisdiction. Assuming that complete external synthesis of natural color results in colorless light, and that incomplete combination in impure or colored light (the impure light being divided into invisible and visible), it must be concluded that the value of the total nerve force belonging to the various parts of one sensory filament is equal to a quotient represented by the sum total of all of its individual sensations if they had been extraneously combined to form some multiple color. From the theorems of natural color which follow, it will be seen that this quotient of value must be equal to some *impure* or *pure white*, but whilst this is undoubtedly so, yet in order to avoid confusion, the value of each filament's resident power and related perceptive nerve-force will be ordinarily designated as its normal power—merely using the specific terms when necessary. In these statements form, magnitude, distance, etc., are totally disregarded, because they are the results of combined action, muscular changes in and on the eye, changes in intensity of natural vibration, other sensory impressions both previously and simultaneously associated, memory, intelligence, etc. These taken in measure, or in all, in conjunction with the knowledge acquired by the sensory portion of the organ of sight, constitute what is called sight, the acme of visual result. To briefly illustrate, take the illusory effect of a picture representing an every-day scene. Here by the careful disposition of color and color only, the artist is enabled to seemingly designate form, magnitude, distance, etc., in fact all of the factors of sight. In this instance it must be acknowledged that the sensory portion of the organ of sight is excited by color vibrations alone, yet it is said that by this excitement the mind is brought to believe that

actual form, actual magnitude, and distance are in existence. How much more so for photographs where there are nothing but the so-called black-white intensities to act as stimuli! A moment's reflection will show how faulty the assertion. The mind through the aid of the senses associates previous knowledge with the present color perception, which gives rise to a pseudo-reality, and the picture appears real. Place the organ of sight in an unaccustomed situation where previous knowledge cannot be of any value. Allow it to gaze on a picture representing the same subject as before, though now seen vertically over the side of a balloon, and it will be found to be at an utter loss to correctly recognize anything but color; no definite ideas of form, magnitude, distance, etc., can be given. There is no previous knowledge, and sight is imperfect. How difficult are the attempts to estimate the length of time occupied during the falling of a small slip of white paper from a high tower to an uniform green sward! How often the calculation that the object has reached the ground is incorrect! The organ of sight is placed in a new and a novel situation, where it has no previous knowledge to associate with its present color perception, and as a consequence, sight is imperfect and the calculation false. Let it assume the same position, say several hundred times, and there will be found to be the most accurate idea of both the time of falling and the correct distance for that place. There is now previous knowledge to associate with the color perception, and sight for that situation becomes more nearly perfect. Crude and vague ideas of magnitude and distance are always given by the inexperienced to lone vessels on open seas or solitary mountains in deserts. In each case the eye sees as much and as well as it ever did, yet sight is imperfect, there being nothing for accurate comparison either in the past or in the present. The sensory portion of the organ is alone properly answered, and color perception is the only correct result.¹

In telegraphy it is not necessary to possess an uncorrelative difference in the form of apparatus to be acted upon by an artificial division of a certain alphabet. As the resultants are only modifications of each other, they necessitate but corresponding changes in the working machinery. If there is a wish to attempt a higher grade of a similar stimulus, the apparatus is so modified as to allow the record to be correctly produced. The tactile apparatus is one form of telegraphic machinery destined to receive

¹ It may be of importance to note that there has been a distinction made in the terms "visual apparatus" and "organ of sight." This has been intentional. By "visual apparatus" is meant the peripheral and the central sensory nerve expansions, with the connecting sensory nerve-fibres, *i. e.*, the ocular or receiving retina, the cerebral or discharging retina, and the connecting sensory fibre (so named optic nerve); whereas, by "organ of sight" is designated the visual apparatus in combination with the entire ocular appendages—the muscles, the media, the tunics, etc. These distinctions apply as well to the other special senses.

its impressions, whilst the visual apparatus is another form of the same machinery intended for the receipt of the same character of impressions; each in itself a simple mechanism, not possessing differentiating power, but merely capable of response when properly acted upon. It would be foolish to assert that there may be special divisions of peripheral tactile nerves especially adapted for the three empirical sensory impressions—cold, warm, and hot; then to make an artificial gross division of caloric into several arbitrary parts, and say that the different varieties of results are the productions of differences in grade and amount of action upon each or all of these fibres (that the actions of natural fixed stimuli cause additions and subtractions of action in unknown degrees upon organisms of elective power). Yet here is Young's theory applied to the sense of touch. A theory slightly modified by such great minds as Maxwell and Helmholtz; accepted and held almost without question. Or how ridiculous to say that there are three tactile substances acted upon and producing three-paired primary tactile sensations, each performing its duty in a sort of give-and-take manner, yet at an utter loss of reasoning to tell which gives and which takes. Here is the wonderfully ingenious theory of Hering considered from a tactile point of view. A theory framed and thrown to the world on account of the want of explanation of complementary color: a theory blindly followed by this great man's satellites and advocates.¹ The same line of criticism might be extended to the senses of smell and hearing, in first supposing several arbitrary odor names, or taking the now existent musical octave, and then endeavoring to form odor and sound theories to explain why these gross recognized differences in natural stimuli are smelt and heard.²

Why take the trouble to give a series of organic elements a coarse unnatural division of fibre, in an effort to harmonize them with an arbitrary and unscientific naming of visible color, when we have the difference of

¹ As these two theories are the best known amongst those that have been advanced since the remotest antiquity, the analogy has been limited to them.

² In the arrangement of this argument it might have been better to have compared these theories with similar imaginative theorems for musical sensation and perception, because not only of the close relationship existing between the two senses employed, but of the author's belief that the special sentient parts of the organ of hearing are intended for the reception and transmission of nerve energies equivalent to sensations of sound vibration alone, and that our ideas of distance of sound, direction of sound, character of sound, etc. etc., are but the results of combined perceptions and conceptions. Nevertheless, he has preferred the use of the sense of touch not only by reason of its wide remove in point of evolution from that of sight, but that he thinks the correlation can be traced here just as well. He also maintains that the peripheral parts of the tactile apparatus are destined for sensations of degrees in temperature only, which are transmitted as nerve-energies of specific and relative value to be perceived by the central organs. Ideas of solidity, weight, etc. etc., are but the results of previously gained knowledge and associated impressions from the other senses, combined with the so-called "muscular sense," which is nothing more nor less than an exact counterpart of the governing muscles of the organs of sight and hearing.

result dependent upon a difference in cause acting upon an ever-ready material? A difference in the character of natural impression affecting one and the same organic element to a greater or less degree, producing an exact and equivalent answer. For instance, suppose that a quantity of optic-nerve points in the human retina should be exposed to a beam of light of undulations, say, equal to five hundred trillions per second, the average response to the sensation thus produced upon healthy tissue would be what is known as "red." Each impinged point would excite a sensation equal to a specific energy equivalent to red. Again, suppose these same points were exposed to another beam of light of, say, six hundred trillions of undulations to the second, they would cause a sensation which would produce a specific energy giving the response of "green." Or let a beam of light, say of seven hundred and thirty-three trillions of vibrations to the second, be thrown upon the same sentient points, there would be "violet" given as the answer. Each and every optic-nerve fibre tip has a receiving power equal to its individual strength. Each and every healthy optic-nerve filament transmits to the color centre for recognition nerve energies equal to as many special sensations as its peripheral tip is capable of receiving. The innumerable quantities of nerve filaments placed side by side on a sheet or membrane serves to give greater field, and to allow many colors to be seen at one and the same time, thus making our every-day and momentary pictures. Therefore, in the author's opinion, the most rational theory is, that color-perception takes place through each and every optic-nerve filament. It consists in the passive separation of a specific nerve energy equal to the exposed natural color, from a supposed "energy-equivalent" resident in the peripheral nerve tip, by an active chemico-vital process of the impinging natural color vibration upon the sensitized nerve terminal. The separated nerve energy is transmitted to the central terminus of the filament in the cerebral retina, where it is fully evolved into such a condition as to be transferred into an automatic form of perception by an action upon some unknown contiguous perceptive nerve elements: this constitutes the consummation of the nerve energy force into the lowest (and evanescent) form of recognizable color-perception. Finally, it is carried through similar posts and stations, though now of a higher value, as it was whilst pursuing its course inwards as a sensation, until at last it is completely recognized as intelligent color-perception in the higher color centres; these higher color cells being permanent in type, and forming parts and parcels of the higher perceptive cerebral centres. The first moment that the primary portion of this action (*i. e.*, the separation) has taken place, there has been left in the peripheral tip of the primarily impinged sensory filament a nerve-energy material equal to the difference between that individual nerve's "energy-equivalent" and the transmitted nerve stimulus. The healthy peripheral nerve tip returns to its "energy-equivalent," or normal nerve power, the mo-

ment the specific energy separated by the received natural vibration has been forwarded for transmission and recognition; whilst the transmitting filament and excited cerebral expansion regain their normal condition the moment the energy has passed them. After the consummation of such an action, the filament is again ready for any other natural color-vibration. The whole secret of the theory rests in the fact, that all natural color stimuli cause definite losses of nerve-energy material, whilst rest of the nerve produces restitution of nerve-energy substance.¹ To see red, the nerve is first supposed to be charged to its normal physiological condition by its inherent vitality and sensitizing material. Vibrations of five hundred trillions per second—a natural red color—are allowed to be thrown upon this sensitized tip. To see the color, the peripheral negative (an unused energy equal to the commencing sensation of a green) must be allowed to rest, by the separation of a quantity of nerve-force equal to a supposed red-energy from the “energy-equivalent,” through the excitation of the impinging ray. This separated specific energy is transmitted to the lower color centre, where, although perceived, it is still more fully formed into a condition fit to be put upon record by certain higher perceptive elements, thus constituting the highest or intelligent perception of red. The moment that the red energy has left the nerve-tip, the terminal is again charged to its energy-equivalent, and is ready to receive any other color-vibration that may be cast upon its surface. The same tip is able to receive as many impressions of natural color as it holds similar sensations under its jurisdiction. Each and every natural color causes the separation of a specific energy equal to itself, which is properly transmitted and correctly perceived, if the conducting and central nerve structures be normal and intact.

It will be noticed that it is presumed that the sensation must begin in the peripheral termination of the visual apparatus (the ocular retina), because it is here that the primary change of an external natural force into an equivalent nerve-energy takes place, *i. e.*, the conversion of a natural impression into the first form of a sensation. This primary form of sensation is conducted inwardly by the so-termed “optic-nerve” (truly speaking, the intermediate connecting link of the optic-nerve), and spread as more thoroughly adapted and as a finished sensation, upon the intracranial retina, in such a form as to be readily converted into an equivalent perception by the aid of some unknown process of mentality. The sensation is first formed peripherally by the impinging natural impression upon an individual nerve tip; it is conveyed inwardly as such, by an intermediate

¹ This is the usual and normal order of progression in the evolution of a recognized color-perception from a natural color-stimulus; although, as will be explained, forces can originate in other ways, which may act upon any part of the visual apparatus or its related perceptive tracts and cells, and thus give rise to visible results.

connecting optic-nerve fibre, and at last is evolved upon a definite portion of the intracranial sheet or membrane as the same sensation, though now completely finished for conversion into a perception of an equivalent value: in other words, an impression of natural force upon a special sense apparatus, causes a peripheral change of that natural force into a nerve-energy (the primary form of the sensation), which is forwarded to a position and in such a manner that it is converted into a perception in certain definitive perceptive structures. This reasoning is dissimilar in measure from that which would be employed in the usual significations of the terms "sensation," "perception," and "impression," although in no way does it allow the visual apparatus to act as a differentiating body. In these remarks, the following distinctions between the terms "impression," "sensation," and "perception," have been ventured, which differ somewhat from those found in the ordinary books bearing upon the subject.¹

1. An impression. The impinging of an extraneous natural force upon the peripheral termination of any sensory apparatus. The action of an outer world and a receiving material.

2. A sensation. The action of a sensory nerve. This in all instances commences peripherally, where a natural impression is converted into a nerve-energy of a relatively equal power; which energy is conveyed to a position and evolved into a condition by the transmitting and central structures of the apparatus, so as to allow a recognition by contiguous perceptive elements. The work of a receiving, conducting, and discharging material.

3. A perception. The recognition of a properly evolved sensation by an act of mentality through the excitation of definite perceptive structures in the cerebral cortex connected in some way with the central terminals of a sensory apparatus. The action of an inner world and a discharging material.

There cannot be any doubt but that the mind must act in color perception, or there would not be any visible world. To perceive color, the mentality must take cognizance of the action of an impinging color-sensation which has been ever altering and becoming higher and higher in its physical and physiological growths, from the time it was first formed from a peripheral impression of natural color-stimulus. If it be agreed that the laws of an act of color perception are similar to those of color-sensation, although the character of the labor of the former is of a higher order, it must be conceded that physical posts and stations intended for the evolution of the material qualities of the perceptive agency must exist. This implies that as color-perception has its regular development and growth, it must necessarily have a scale of efficiency or ratios of percep-

¹ In these definitions, abnormal and pathological stimuli are excluded.

tive powers. Endeavors to accurately place or express these powers, or even to give analyses of their various strengths, are futile as long as the union between mind and body remains a locked secret. It may be assumed, however, that there is much difference between what may be termed intelligent color-perception and automatic color-perception; and at this point, at this gross dissimilarity, the human mind with its present knowledge is compelled to stop. Automatic color-perception (by some termed color-sensation) is the primitive form of the perception, where although the color is recognized, yet the mentality is of such a low order that the perceptive color cells which have been primarily impinged—perceptive cells of evanescent power—would quickly lose their new quality, and the color-perception be forever lost, if they had not the power of transmitting it to the higher color-cells in the centres where intelligence, etc., the creations of the higher mentality, are brought into play, and which place it, as it were, upon record, so that it may be used in future requirements. In this higher situation the perception is stamped, the internal consummation of the external force takes place; here it is that the higher color-cell is either deposited or augmented so as to be brought into action as often as a proper stimulus attacks it; and it is at this place that these very cells live and play their roles, growing fat and healthy from use, shrivelling and dying from inactivity. What may be the situation of these higher cells of permanent powers, and how they live, must remain unanswered; for although physiological experiment and pathology have taught the probability of position of the lower forms, they have thus far failed to reveal the phenomena of individual and separate existence. No matter whether a force be of external or internal origin, if it either acts upon these higher-formed cells or makes a new corpuscle, it will cause intelligent color-perception (the so-called “perception”), because the newly formed higher cell or the increased material is in a proper condition and a correct situation to act in its turn upon the whole force of contiguous mentality. As the greater part of this mentality has been derived from the accrued results of the other sensory organs as well as from the visual apparatus, there may also arise an action of all of the other responsive cells, which response will cause an act called *sight*. So it is with the other sensory organs and channels from the outer to the inner world. Audition, olfaction, gustation, and taction, each may have added to its individual capability such mental factors as will produce hearing, smelling, taste, and touch. The manifold combinations of these final results with each other as well as with the processes of the deeper though derivative mental forces—such as emotion, volition, intelligence—constitute the *ultimata* of mental activity. The results of hypnotism, somnambulism, or in fact any of the so-called disturbances of the ganglion cells of the cerebral cortex, conclusively show this distinction. All this bears out

the saying of Epicharmus, the old Greek poet: "'Tis mind alone that sees and hears; all things besides are deaf and blind."¹

The questions now arise: What is strictly meant by the expression "energy-equivalent"? Why is it supposed to reside in the peripheral termination of each optic-nerve filament? What is its value? What is understood by the term "specific energy"? Where is its residence? Why were these nerve-energies chosen? What is meant by normal condition? The combined answers to this series of questions may be given in the following paragraphs. At the peripheral tip of every optic nerve filament, there must be two separate and distinct actions in the receipt and the conversion of a natural color-stimulus into an equivalent nerve-energy. First, a separation of a nerve-force physiologically equal to the amount of the natural stimulus of the impinging extraneous vibration, from the normal conditions of the "energy-equivalent" resident in the tip of the impressed nerve; and secondly, a return to the now lowered remaining nerve-energy material, of an energy matter equal to the separated amount of force, the moment the natural color-stimulus is withdrawn, thus changing the remaining energy to the normal energy-equivalent. What this force is, and how it is formed, separated, propagated, and reformed are all difficult problems to attempt to answer. Many thoughts, such as chemical decomposition, molecular vibration or oscillation, direct transmission of vital force, suggest themselves, but no one can positively say which one of these, or whether all, or even some other yet unknown force, can be considered as the true sensory actor, until discriminating instruments can be brought to play upon the living and acting organism. It is probably of a purely chemico-vital character, placed in such a situation as to permit stimulation of natural color upon it. It is not possible to give it any determinate and fixed ratio of value, because this must be dependent upon the vitality and strength of each optic nerve filament. Each tip is born into the world and exposed to light with a definite amount of developed physical material just as any hereditary or congenital feature, a foot, a hand, etc., and it, through the same amount of physiological action as another optic-nerve tip not so well developed, gives greater and finer results than its fellow; thus stamping that individual optic-nerve tip in its peculiar power of action. Again, if two tips have primarily the same amount and the same grade of physical structure, their life histories may be such, in reference to situation, position, exercise, etc., that they will each develop and

¹ The fact that the reader dissents from this division of action in vision, and desires rather to believe in the terms "impression," "sensation," and "perception" as generally received, does not affect the correctness of the theory at all. The author gives but his personal beliefs as to the use of the expressions, which might with equal propriety be abolished by any disbeliever, and yet the foundation of the fabric remain secure and untouched.

have far different sensory material and power. Roughly speaking, the quotient of value of each individual "energy-equivalent" is equal to the subjective sensation (with consequent perception) of as pure and as colorless an energy as its individual past objective sensations would make if they had been extraneously combined as separate color vibrations to form a natural impure beam of light (some impure white).

By the term "specific-energy" is meant a specific amount of sensory nerve force which has been primarily separated from an energy-equivalent resident in the peripheral terminus, by the action of an impression of natural color. This separated energy always bears a definite relation to the amount of natural color-vibration. After separation, it is evolved into a higher grade of action during its passage along the transmitting apparatus, until at last, it is spread as an almost fully developed force in a relatively similar position upon a cerebral membrane ready to be still further charged to a sufficient vitality to act and to be acted upon by some mental equivalent.

The reason of the choice of these two forms of this special sensory force must be palpable after the above explanations; they serving as full an answer to the proposed questions as any other that might be added. Besides, such a theoretical designation of nerve-energy admits of much more convenient practical testimony in its behalf, than any other form of speculative argument bearing upon the subject.

The last question, "What is meant by 'normal condition'?" is almost self-answerable. It was chosen, however, to serve as an expression of difference to the specific term "energy-equivalent," as expressing a mere physiological rest, just as would be found in the normal condition of any other acting body. In this distinction, it must be understood that there may be a primary excitation of this material by some internal force, with a resultant corresponding physiological action, just as freely as if the "energy-equivalent" had been stimulated.

This theory has the following theorems of natural color for its basis:—¹

1. The general convenient adoption of the seven so-called primary colors, or of the solar spectrum being made of three graduated overlaying spectra must be discarded, as these are nothing more nor less than crude visual and mental distinctions made through the want of perfect physical condition and physiological ability.

2. A difference in kind of undulation makes a change in natural color, and every such change must be called a "primary natural color" or a "pure natural color"; on account of its being the representative of a specific character of vibrations totally different and distinct from any other primary natural color. There are as many separate primaries or

¹ By "natural color" is meant every species of independent and combined light vibration (except total synthesis), in contradistinction to "visible" or "sensory color," which is a mere visual and mental exponent of such wave lengths.

pure colors as there are difference in undulations between the extremes of color-vibration.

3. A "secondary natural color" or a "tone" is the result of the addition of any two pure natural colors or primaries.

4. A "multiple natural color" is the result of the addition of two or more tones, or of more than two pure natural colors.

5. Colorless light is the compound of all natural color, the origin of all separated natural color vibrations. The purest example may be represented by the synthesis of a resultant spectrum produced from the combination of all of the spectra of all of the natural elements in all possible conditions. To human knowledge, there is no single natural body which contain all of the natural elements; consequently to human knowledge, there is no individual body that can give rise to pure colorless light. Every light-giving source, such as a sun, electricity, chemical and animal change, gives a definite color-spectrum equal to its constituent elements. Hence there must be two varieties of colorless light, pure and impure.¹

6. By an inherent synthetical power, every light-giving source gathers and collects all of its individual elemental spectra into a compound natural energy. Portions of this energy are propagated into all free space as undulations equivalent to those of invisibly impure and visibly impure colorless light. These vibrations upon being received by a natural object, are either fully absorbed, totally reflected, or broken into two portions, the absorbed and the reflected; this being dependent upon the nature of the impinging beam and the character of the impinged object; the reflected portion gives the natural color to the object. The amount of the separating action is dependent upon the relation existing between the active power of the impinging beam and the passive resistance of the body. A slightly impure beam is able by its relative action upon innumerable bodies to separate itself into innumerable colors, whereas a decidedly impure beam separates only the varying tints and shades of its own kind.²

7. Pure complementary color. Every natural color has its complementary, to which, if it be combined in certain ways by a natural object, gives either pure white or pure black.

Pure white is caused by the simultaneous reflection in a definite direction of any two pure complementary colors, or of any even multiples of pure complementary colors, from an impinged natural object. Hence,

¹ The impure white light of the earth's sun is an impure colorless beam, the representative of the solar constituents.

² As a matter of course, the visual apparatus cannot see invisibly impure light. Such light falls upon the sentient parts of the retina as well as upon any other natural body which absorbs and reflects. The amount of reflection gives to these sentient tips their natural color. They are fitted to respond only to energies equal to impinging reflected rays. (All transmitted rays to be seen, must have surfaces or points of reflection.)

pure white is a positive or a visible tone, of which there may be innumerable varieties.

Pure black is caused by the simultaneous absorption of any two pure complementary colors or of any even multiple of two pure complementary colors, by the passive action of an impinged natural object. Hence, pure black may be considered as a negative or an invisible tone, of which there may be innumerable varieties. It is not a color, and has darkness for its equivalent.

8. Impure complementary color. Every natural color, primary, secondary, or multiple, has innumerable impure complementaries. If there should be a combination in certain ways of any one or more of these natural colors with one or more of its impure complements, there will result an impure white or an impure black—a tint or a shade.

A tint is the simultaneous reflection in the same direction of two or more impure complementary colors, from an impinged natural object. The preponderant wave serves as a basis for the color.

A shade is the simultaneous absorption of two or more impure complementary colors by the passive action of an impinged natural object.

9. Darkness: two conditions.

a. Produced by the interference of two or more series of undulations. The rising phase of the one exactly corresponds in position and time with the sinking phase of the other; thus they neutralize each other, and give rise to the loss of positive color. It may be designated as positive undulations so interfering as to give negative results. Of these, there may be many varieties.

b. True absence of light undulation. Here there are no stimuli productive of color ether-waves, hence no results, either positive or negative. This condition is directly opposed to pure colorless light.

PHYSIOLOGICAL RESEARCH.—As before intimated, in the human system, every special sense apparatus has three separate parts. First, a peripheral expansion intended for the reception of natural vibration equal to its powers of primary sensation. Second, a series of telegraphic communications, inclosed and insulated, separated and adapted for the transmission and the partial evolution of equivalent nerve energies. Third, a central expansion, upon which is spread the received result, ready to be fully evolved and transformed into a perception by a contiguous nerve material endowed with the power of mentality. The visual apparatus is but one of these forms; a sensory nerve development adapted for impressions of color; and from this standpoint it must be studied. Naturally, inquiry would be made for methods of determining the comparative relations existing between the exciting stimuli and the degree of sensory power of the apparatus. Mathematically, this has been found totally inadequate; so that at present, not possessing any absolute data for ratios

of equivalence between the strength of the impinging beam and the appreciation or value of sensation of the receiving fibre, except those based upon physiological investigations and clinical experience, these have been deemed sufficient for a time at least, to endeavor a proper enunciation of the theory. The question of the value of theorizing as to the *modus operandi* falls to the ground, the moment that it is unbiasedly considered that having but one premise fixed to the equation no conclusion can be arrived at. Theoretically, the beam of light of the least number of vibrations should be that of the easiest recognition, but then the questions arise—Does not such a beam cause less sensory disturbance? Does it not excite the filament the least? Would not a stronger natural impression give a correspondingly stronger nerve-energy? What relation may the intensity of the natural color vibrations have upon the ease of impression? All of these are serious questions, which must remain unanswered until ingenious instruments of such precision are made, that can with unerring accuracy and the utmost delicacy give the actual rates of known impression and passage of equivalent nerve-energies. All, therefore, that can be reasonably presumed, is, that there must be a normal condition to which the nerve filament must return after each individual impression has been conveyed. This has been brought forward more at length in the previous part of the paper, and upon it the whole superstructure rests. In this section of the subject endeavors shall be made to study and give some physiological explanations for its choice, and add a few reasons why its probability may be entitled to belief. After much deliberation, it has seemed best to consider the different results under the following heads:—

First. Color-perception as produced by color-sensation commenced in the macular region of the ocular retina.

Second. Color-perception as caused by color-sensation primarily formed in the circummacular region of the ocular retina.

Third. Color-perception directly resulting from provoked remaining nerve-energies. Subjective after-color (so-called complementary color).

Fourth. Color-perception caused by the action of internal stimuli upon nerve-energies which have not been lowered by any preceding act. Subjective color.

First. Color-perception as produced by color-sensation commenced in the macular region of the ocular retina. From time to time experiments have been instituted in various ways to determine the qualitative and quantitative limits of normal color-perception derived from color-sensation primarily made at the macula lutea. Those for the determination of the latter have been the more numerous, and these have been limited to a few of the more important and valuable color differences. As might be expected from theory, experimentation has revealed that although all individual macular regions have definite relative powers with each other, yet no two possess exactly the same amount of color-sensation; thus con-

clusively showing that each has a different amount of nerve-tissue and nerve-energy. This can be understood when it is considered that the great varieties of physical differences in similar normal organs, must necessarily give proportionate differences in normal physiological action. Consequently, here it has involved the use of standards for a proper solution of the average strength of color-vibration upon those optic-nerve filaments which are deemed by all physiologists to be of the highest physical organization—the filaments resident in the yellow-spot. Briefly, the order of the standards for five of the most important colors have been red, yellow, blue, green, and violet, showing that a natural red vibration excites an optic-nerve filament the quickest, followed by the others in the order given above.¹ At present it will not be necessary to offer any explanation why these colors follow each other with such regularity. Suffice it to say, that, as before intimated, it can never be hoped to gain a proper solution to the problem until vital energies can be reduced to mathematical certainties, although an adequate answer, based upon the combined results of physiological research and pathological study, will be reserved for the concluding paper.

Second. Color-perception as caused by color-sensation primarily formed in the circummacular region of the ocular retina. Really no sharp line can be drawn between these two headings, as one is a gradual lessening of the other; but as the experiments have been dealing, in the investigation pursued in this connection, with the furthestmost limits of the generally used portion of the ocular retina, in contradistinction to those of direct use, it has seemed better to make the classification so as to have a comparison between the weakest and the strongest filaments of the nerve. Two plans were adopted: One, to consist in the study of the ordinary visual fields, and the other in investigations as to the possible recognition

¹ This has been partially determined, and will, probably, be continued by the writer in experiments differing somewhat in detail of method from any others with which he is acquainted. An emmetropic eye with good color vision is placed at the extremity of a blackened tube six metres in length by ninety millimetres square. No light is permitted to enter the eye, except from the opposite end of the tube, and this through a graduated double shutter, practically similar in all respects to the author's color-sense measure (description in *Archives of Ophthalmology*, vol. x. No. 4, p. 438), with the exception that transmitted light is used instead of reflected, as in his previous experiments; this being accomplished by the substitution of thin, transparent plates of colored glass, or gelatine, in the opening between the shutters, for the squares of colored paper previously employed. The movable slides in the newly adapted color-sense measure are slowly separated, and the area of exposed color registered the moment it is properly designated. This plan is pursued in such a manner that there can be nothing but a certain amount and kind of color-stimulus to affect any desired region of optic-nerve filaments. To complete the experiments, and to make them of fixed value, there should be some mechanical device constructed by which the shortest time necessary for the perception of the color could be accurately determined and registered. Valuable results might also be obtained by diminishing the illumination as in the experiments of Bull.

of all of the colors (equal to the power of the individual macula lutea region under observation), in the periphery, by increase in illumination or in quantity of color exposed.¹ As far as gone, all of these showed the following results:—

¹ It has not been thought necessary to accurately describe the proposed methods, but merely to state the character of experiment with a description of the instruments in use. For the first series, perimetric observations are made with areas of reflected color upon both black and white surfaces, as well as examinations of the same character, by the employment of transmitted color-stimulus alone. This latter method is deemed worthy of full description, not that the device of instrument is the best, but that the plan in itself is probably the only proper way to obtain accuracy in the size and extent of the different visual fields. In a large darkened box with a circular opening cut into one of its sides, there is placed a normal emmetropic eye, at about thirty centimetres distance from a small roughened wooden button fastened against the upper end of a narrow flat glass rod so arranged that both the eye in the box and the button in the centre of the open area will be situated on the level with each other. This window is of much greater size than any normal visual field. A piece of pasteboard several times larger than the opening in the box is held against the window. In the centre of this pasteboard screen there is a hole of one centimetre square, in which can be placed thin sheets of colored glass or gelatine. As many pieces of color may be used as desired. By sliding the large pasteboard card so that its central hole may be allowed to perform excursions in all directions from the periphery of the now covered window to its centre (which centre is made visible to the eye within the darkened chamber by the rubbing of the wooden button with a piece of stick phosphorus), the hole in the immense shutter is caused to act as a definitely sized area of movable transmitted color stimulus. The moment the color is recognized, as it is brought inwards, its distance from the luminous button is measured, so that when the circle is completed, the different distances can be registered upon small memorandum slips ruled to proportionate values of space. As many different color fields as desired can thus be taken, and small registers kept for future reference and accurate comparison. The objections as to the methods being crude, cumbersome, tiresome to the patient and surgeon, the difficulty of working the instrument, etc., might be easily overcome by the substitution of adaptations of better construction. In the studies pursued in this paper, all this would be but afterthoughts, as here it is but desired to get a working instrument of sufficient capability to give proper answers to the experiments. The advantage of the plan must be manifest in the fact that there is no other stimulus present except that of the desired color and a faintly luminous spot of just sufficient visibility to keep the optic nerve fibres of the macula lutea fixed in a position to preserve proper steadiness of the globe.

The second series of experiments, where it is designed to study the comparative strengths of the most peripheral and the central distribution of optic nerve fibres in the ocular retina, have been partially attained and will be probably accomplished by putting the eye in a darkened chamber. The macula lutea will be kept fixed upon a small, white, faintly-luminous object consisting of the passage of common daylight through a piece of uncolored translucent glass placed in a hole one millimetre square cut in one wall of the chamber. In a position corresponding with the most peripherally used parts of the retina (*i. e.*, the outer horizontal meridian of the visual field), thin, transparent plates of colored glass or gelatine of known values are to be placed in an opening ninety millimetres square cut in the wall of the chamber in which the central hole is pierced; this opening can be changed in position to correspond with each case. In this opening there is a movable slide of the same character as in the author's color-sense measure, by the working of which, any desired amount of color surface may be impinged upon by direct and indirect beams of sunlight of greater and

1. By the same amount of daylight, the superposition of a definitely sized area of unglazed reflected color upon a dead black surface, gives the largest visual field to white, followed by yellow, blue, red, and green in the order named.

2. By the same amount of daylight, the superposition of a definitely sized area of unglazed reflected color upon a white surface, gives the largest visual field to yellow, followed by blue, red, and green in the order named.¹

3. Perimetric observations upon black backgrounds, show that with equal illumination, all reflected colors undergo definite changes during their passage across the fields towards macular fixation.

The following is the order for those experimented with: A definite area of white first gives a peripheral sensation of gray, which gradually passes to white. The same size of yellow impression, first appears as gray, then white, then lemon-colored, and at last yellow. Blue first appears as gray, and successively passes to white, bluish, and blue. Red first shows itself as gray, then white, followed by orange, salmon-color, and red. Green first appears as gray, then white (sometimes bluish), and then greenish, before it gets to its true color.

4. In perimetric observations with reflected color upon a white background, the same phases of color-change are undergone as in similar ex-

greater intensity, at last supplanted by gauged intensities of electric light. These beams are made to pass through a blackened tube six metres in length by ninety millimetres square, placed on the outside of the chamber; the extremity of the tube being fastened against the large eccentric opening containing the different colored plates. This contrivance enables us to expose to the peripheral portion of the observing retina, graduated intensities of chosen colors. Notes of the size of the color stimulus and of its intensity will be taken as soon as the color is properly called. A ready comparison between the qualities of the same color as perceived through the peripheral fibres of the ocular retina and through the macular fibres of the same ocular retina, will be made by putting a similarly colored piece of glass or gelatine as has been used in the large eccentric opening, in the place of the plain translucent glass used for macular fixation, and giving to it the same amount of illumination as has been used for the peripheral color. To estimate the proportionate physiological values of the most peripheral and the macular optic-nerve filaments, more and more surface of the eccentrically seen area will be exposed until the macular and the peripheral colors are determined to be as alike each other as can be gotten. (This plan is but a modification of that of Charpentier. Snellen, Landolt, and Aubert have experimented in other ways.) After the establishment of the visual results, valuable information as to the order of peripheral loss of colors could be easily gotten in a series of converse experiments by mathematical diminution of color intensity and area.

¹ As black is not a color, its relative situation was not placed in the list, although a similar area of it upon a larger surface of white was tried, which showed a projected position of the unimpinged optic-nerve filament into the visual field. This area of defect was made known far more peripherally than the places of primary receipt of any of the color vibrations, on account of its being inclosed in a space of recognized white stimulus.

periments upon a black background; every color tried, with the exception of white, first appears as an area of non-impression.¹

5. When visual fields are produced in the same amount of daylight, by the use of transmitted color, the largest area is that of white, followed by yellow, blue, red, and green.

6. As far as investigations have gone, the following may be laid down as a rule. By increased light stimulus all of the different colors responded to by optic nerve filaments in an individual macular region can be recognized when exposed to the most peripherally used elements of the same retinal area.²

Third. Color-perception directly resulting from provoked remaining nerve energies. Subjective after color (so-called complementary color). The term complementary color has been avoided because it does not express the true condition of things; it only shows that there is a color which appears to be the complementary of another color previously seen. Therefore in consequence of a wish to give a precise designation for the character or kind of action as well as one for the state of existence of the working material, in the place of a term which is merely indicative of a recognizable symptom, the above expression has been substituted. Possibly it might have been advisable to have placed this part of the subject under the heading of the so-called color-blindness, because both conditions are nothing more nor less than true species of each other. As will be explained, the former is a momentary faulty answer, the resultant of imperfect physiological work, through normal physical incapability; whilst the latter is a permanent³ faulty answer, the resultant of imperfect physiological work through abnormal physical incapability. On account of "complementary-color" being as universal as vision itself, it has assumed a similar physiological basis, and must be considered under

¹ This is readily explained. In this experiment we are dealing with a white background, which is the largest visual color-field. All the other color-fields are proportionately smaller; hence the boundary of the white field must be the peripheral limits of color-vision. A small white area is first seen as gray at the border of its white field, because at this point it necessarily must give its first weak sensation. The other color areas have a certain space of peripheral white color vision to travel over before they commence to be recognized; consequently, the superposition of one of these natural colors anywheres in this space, must necessarily take away the vision for white in the superimposed position, and yet fail to give any impression whatever. Hence as a consequence, there is an area of subjective darkness—an area of unrecognized color-stimulus.

² The author's experiments in this direction have not been completed. They have been limited to the mere question of recognition of the five color-differences—white, yellow, blue, red, and green. He has partially determined that the comparative values of the experimented colors are in the order as given above.

³ By "permanent" is meant a time corresponding to the continuance of the causative pathological structural change.

the physiological laws of the visual apparatus. Hence it has been placed here. In order to facilitate the studies in this branch, the results and reasonings of previous investigators have been combined with some additional experiments and analyses, and from these, certain suppositions as to causation have been framed. As said in the other headings, it does not seem necessary to give each individual example of research; for, besides being burdensome, it would but add much unnecessary detail, where resultant averages could be readily formulated and briefly given. It must be granted that all such changes are necessarily of a purely subjective type—a momentary alteration of physical structure causing a consequent relatively faulty answer. The exciting stimulus may be either peripheral or central—external or internal; it does not matter which, as long as there is a passing fault in the machinery, there will be a corresponding fault in the product. This gives the first grand division of “subjective after-color;” first, those produced from the external world or natural light stimulus; and second, those from some internal stimulus, either in the visual apparatus, or in the cerebrum beyond it. In a previous paragraph it has been more fully shown and explained that every sensory nerve has at its peripheral termination two separate and distinct actions in the receipt and the conversion of a natural color-stimulus into an equivalent nerve energy; first, a separation of an amount of nerve force equal to the amount of an impinging natural stimulus, from the normal condition of a resident nerve-energy; and second, a regain or a return of an equivalent amount of material to that nerve’s “energy-equivalent,” the moment the natural stimulus is taken away. This rule holds good for the entire length of the sensory filament as well as for the related perceptive elements in the cerebral masses. Should there by any means be another color-stimulus presented to the primarily impinged optic-nerve filament tip, before it has had time to regain its normal condition, the new color-stimulus will be reduced in its equivalent action by as much as the primary color-stimulus has taken away, and the result in all cases will be a proportionate difference. In other words, there is a moment before the lowered sensory nerve can be made to properly obey its physiological law. Thus, suppose a red stimulus should be superimposed upon a white stimulus (*i. e.*, a red wafer upon a sheet of white paper), and that the red vibrations should be allowed to impinge upon an optic-nerve filament, the natural stimulus would separate a nerve-energy equal to itself from the “energy-equivalent” of the impinged optic-nerve filament, and continue to do so as long as the red stimulus is there. This is an act of continued separation. Again, suppose that this natural red color should be suddenly removed. By this act there would be a natural stimulus of white sent to the same nerve in which the “energy-equivalent” has been lowered to an energy of an amount equal to the difference between the nerve’s normal power and the red energy. No time has been allowed for

the "energy-equivalent" to be properly re-formed. There would now be a dual action for the impinged nerve—a regain of the separated amount of the red energy, and a separation for the impression of the natural white stimulus. The result would be a difference between the white and the red, which is equal, in this case, to the commencing sensation of some green.¹

The same thing occurs when the so-called complement is provoked upon some other color surface than white. By the sudden substitution of a new color-stimulus, the excited nerve is rendered momentarily abnormal for the amount of regain of the primarily seen stimulus. If this second color-stimulus be of greater value than the amount of nerve-energy left in the optic-nerve filament tip, the actual result will be an answer to a nerve action equal to the amount of energy left by the primary stimulus, which of a necessity will always be a complement of the primarily seen color. To explain: if a natural red stimulus be superimposed upon an orange ground, theoretically in this particular instance, there would be either one of two things, each dependent upon the separating power of the second color. First, a proper receipt of the natural orange color (in which case there would not be any complement at all, because both the primary and the secondary natural color-stimulus would be properly answered), provided that there be sufficient nerve-energy material left from the separating action of the primary red stimulus upon the energy-equivalent of the optic-nerve filament tip, to be separated for transmission and perception of the after natural orange stimulus. (Here the separating power of the second natural stimulus (orange) is considered to be low.) Second, a subjective after-color of some green upon the orange ground. The remaining energy would be stimulated to its utmost by a natural color of greater power than it is capable of receiving. As has been shown, the energy that is left is always equal to the subjective complement of the primarily seen color; and, as a consequence, this amount of energy is all that can be separated for evolution into a completed perception. (In this latter supposition, the separating power of the second natural stimulus (orange) is considered to be high.) This latter is what takes place when the so-called complement is produced.

The belief that black is the complement of white is obviously incorrect because it is based upon false premises. This refutation admits of ready

¹ A good example of a subjective after-color produced from a natural white light after prolonged exposure of the eye to a red stimulus, was once experienced by the writer. One dark night whilst he stood watching some men at work before the blast furnaces of a large rolling-mill, his attention was particularly attracted towards several huge pieces of iron heated to a cherry-red color, that were standing in a dark corner. He gazed at the blocks for some time, and upon turning to walk down an unlighted street, noticed that the light of a distant lamp appeared bright green, and continued so until he had nearly reached it. He then saw that the lamp was covered by a white shade.

explanation; for when a certain number of optic nerve filament tips have been exposed to a definitely sized square of natural white stimulus upon a larger area of neutral gray surface, there is an answering nerve material separated as a white energy as long as the tips are directed towards the natural stimulus. As this white natural stimulus has been derived from an ordinary impure natural colorless energy, it contains all of the complements of that natural energy, and *par consequence* must have impressed and separated all of the nerve material of the impinged tips. This separated white nerve energy is transmitted and evolved into a perception of white. Suppose this certain natural white stimulus be stopped, and another similarly sized and placed area of white stimulus be given to the impinged nerve-tips before a formative action could have taken place in the nerve energy material; all white sensation and perception would be at an end, because the second white natural stimulus would take away the nerve-energy material as fast as it would endeavor to re-form, and would not allow any of it to be separated for transmission and perception. This condition would last until the nerve-energy material could sufficiently regain itself for separation. Consequently there would be a space of true physiological darkness equal in size to the space occupied by the primarily perceived white color, which was produced from the first natural white stimulus: an area of "physiological nothing" made visible by surrounding color, just as a hole in a board is seen; this area being dependent upon the inability of the peripheral tips of a quantity of sensory nerves to properly receive a series of impressing natural waves. This can be proved by the following experiment: Make of unglazed paper a card containing three concentric rings, each ring of three centimetres width. Let the middle one be white, and the two outer ones black. Hang the contrivance directly in front of a nine centimetres wide ring of white paper, upon the gray wall of a badly-lighted room, in such a manner as to completely hide the white-ring card. Gaze attentively at the black and the white rings for at least fifteen seconds. (Preferably do this when tired and fatigued, as the result is much more prompt and vivid.) Whilst keeping the eye steadily fixed, have the outer card suddenly removed, which action will give the impinged optic nerve filament tips a white stimulus to respond to. Instead of a receipt of white there will subjectively appear three concentric rings, the outer ones being white, and the inner one *dark*. This experiment also explains the fact that the exposing of sensitive peripheral nerve-tips to a black surface does not cause a separation of sensory nerve force in the exposed terminals; thus conclusively showing that the popular idea of white being the complement of black, is nothing but a crude and false deduction based upon premises which confound a want of action with action—an error that has arisen through the belief that a black surface is an area of natural sensitizing material.

The superposition of a natural white stimulus upon any other natural color-stimulus than white, practically causes an area of momentary darkness, because the primary natural white stimulus has used all of the resident nerve force, and time has not been allowed for the formation of sufficient material to transform the second natural stimulus into an equivalent nerve-energy. This want of action prevents the second natural color from being perceived.

The series of passing subjective after-colors produced by excluding all natural light rays from the visual apparatus, after it has gazed for some time upon pieces of white paper on black surfaces, held in direct sunlight, seem to depend upon the fact that the primary extraneous white stimulus has been of such great intensity that even after it has been completely removed, it has left an irritant action in the exhausted peripheral tips, which of a necessity will separate for transmission and perception specific nerve-energies from the re-forming material as fast as the material is poured into the tips. The fact that the irritant action is ever decreasing, with a proportionate gain of the nerve-energy material in the tip, is the cause of the succession of subjective colors. For instance, a definite number of optic nerve-filament tips have been exposed for some seconds to a white stimulus of very great intensity. The extraneous stimulus is suddenly stopped. All of the nerve-energy material has been extracted from the exposed tips. A formative action immediately takes place, but this is met with an irritant in the shape of the remains of the intense white natural stimulus. A contest takes place between the formative action of the nerve-energy material and the irritant. The irritant separates the nerve material as fast as formed. The gradual loss of irritating action is evinced in the passing changes of perceived color. The victory is given to the nerve-energy material, because the material has had a source of constant renewal, whereas the irritant action has died from the want of fresh supply of natural stimulus. It may be that this result is indirectly augmented by a devitalizing action of the intense white stimulus upon the organic constituents of the tip itself, which physicial alteration prevents proper physiological working; the various color changes being dependent in some measure upon the character of the reparative action taking place in the recipient tissues. This supposition is borne out by the so-called blending effect of direct sunlight upon the human retina.

If, instead of excluding the visual apparatus from all natural light after it has gazed for some time upon the pieces of white paper on the black surfaces held in the bright sunlight, it should be immediately re-exposed to the same slips of white paper to which the first exposure was made, there will subjectively appear the same character of passing colors as were made subjectively visible in the preceding experiment, except that now they will progress in a *reverse* order. The reason for this can be readily

given. During the time that the reimpressed exhausted tip is gradually gaining sufficient nerve-energy to transmit the second natural white stimulus, there is a corresponding separating process continually taking place, dependent upon the great intensity of the *second* natural white stimulus. These separated amounts of nerve-energy are forwarded to the perceptive centres where they are recognized. This continues in a definite order of gain, until at last the second natural white stimulus is able to be properly received as an equivalent nerve-energy, which is transmitted and perceived as "white."

Both of these experiments first show the so-called "objective complement" of the primarily exposed natural color, followed by visible expressions of regain of nerve-energy material under different circumstances.

The subjective after-colors seen by an eye exposed to a feeble stimulus of natural color when its fellow is made to receive a strong stimulus of some other natural color, must necessarily be dependent upon a transformation of a "remaining energy" of one of the primarily used perceptive color-cells belonging to the strongly impressed visual apparatus, to an equivalently placed perceptive color-cell belonging to the weakly impressed visual apparatus; the primary weak excitation of the secondarily and internally impinged perceptive color-cell causing a primary separation of but a minimum amount of nerve-force material to be regenerated for recognition and projection of the internal stimulus. It is nothing but the action of the "remaining energy" of a lowered though highly excited perceptive color-cell belonging to one channel to the external world upon another similar and responsive perceptive color-cell with a "remaining energy," belonging to a like channel to the outer world. As the most probable cause for this character of response must have been dependent upon a connection of the perceptive cells belonging to the two sensory apparatuses, although, from the very nature of things, all normal human cerebral action must ordinarily be dual in its physical nature and physiological action, yet it is the most reasonable to suppose that *at the time* of the double action of the visual apparatuses, the perceptive cells of each were physically and physiologically thrown into connection with each other. How this may have been done, whether by continuity of material tissue, chemically or by some unknown agent, it is impossible to say. That there is an organic or life connection at such times is known by the blending of the finite results; but even if continuity of molecule could be traced during such action, the fact of a new perceptive color-cell being attacked by a definite stimulus, which sets free a specific energy, does not destroy the weight of the argument that might be forwarded for not considering it a "subjective after-color" in the same light as the author, because the internally impinged cell has been lowered to a "remaining nerve-energy" by its weak primary action. Thus, in one of the interesting and ingenious

experiments by Gorham,¹ where a subjective green is made to appear to a visual apparatus which has been exposed to a weak natural white stimulus, whilst the opposite visual apparatus has been given a strong stimulus of natural red color, the answer cannot be arrived at in any other way. The fact of white being the weak primary separation in this experiment appears as a vulnerable point in the argument; but the force of this is controverted by the extreme weakness of the intensity of the action from the natural white color, in contradistinction to the great strength of the opposite internal stimulus, the question being one of a difference in intensity.

The same character of reasoning that has been offered in explanation of the preceding class of experiments may be adduced in favor of the so-called "simultaneous contrast colors," in showing that either the action of simultaneously powerful and feeble intensities of natural color stimuli or of a prolonged exposure of a strong and a weak natural color impression upon a series of contiguous peripheral nerve terminals of the same visual apparatus can readily provoke an internal irritant action in the strongly excited perceptive color-cell, which will, in its turn, cast the entire brunt of its remaining nerve-force upon its feebly excited neighbor, and thus rouse the now secondarily impinged cell into a corresponding action. This is found to be most likely the case, when it is remembered that these cells have probably through their simultaneous primary action been physically and physiologically thrown into connection with each other. It will not be necessary to give the many variations of this variety. The recital of two experiments will suffice for all. First, when a small square of weak red stimulus placed upon a large area of intense natural red appears greenish, the supposition as to causation belongs to the first rule—"simultaneously powerful and feeble intensities." An experiment illustrating the second rule, *i. e.*, prolonged exposure of a strong and a weak natural stimulus may be cited by having a small strip of dull-grayish paper placed in juxtaposition to a similarly sized strip of a bright-green paper, in which case, after some seconds' exposure, the border of the dull-gray strip next to the bright-green will have a reddish cast.²

The so-called "multiple complements," or rather "alternating subjective after-colors," as, for instance, in the following example, where alternating subjective perceptions of green and of red have been aroused by

¹ "On the Blending of Colors by the Sole Agency of the Sensorium." By John Gorham, M.R.C.S., Tunbridge; *Brain: A Journal of Neurology*, vol. iv. p. 467. As early as 1808 Sir David Brewster obtained similar results in an almost identical way. (*Vide*, p. 257 of the first American edition of *A Treatise on Optics*. By Sir David Brewster, LL.D., F.R.S.L. & E., etc., Philadelphia, 1845.

² These experiments might be multiplied almost indefinitely in different ways, with varying though corresponding results. Buffon, Schaeffer, Westfield, Chevreul, Brewster, etc., have all given a great number of interesting modifications of this variety of subjectivism.

sensory and perceptive materials set into activity through the action of either a recognized objective natural green color or a subjective green in producing a red subjective after-color, are most probably dependent upon momentary alternating regains and discharges of sufficient energy material to perceive color energies equal to, first, the primary energy and then its subjective after-color, after having had perceived the subjective after-color. It is a modification of the same old battle though now transferred to the perceptive cells; the changes in the passing results being dependent upon some peculiar condition under which the new variety of weapon is wielded.

So far the first division has been discussed. Endeavors will now be made to explain the causes of the different actions coming under the second head, where the visual apparatus has either an irritant taking birth within itself or a cerebral stimulus to respond to. In the first instance, there cannot be any doubt but that it is possible for the subjective after-colors to be provoked by an irritant affecting any part of the visual apparatus. Suppose the following case: sudden squeezing of the sensory elements of the transmitting parts of the optic nerve, from some momentary blood-pressure increase, with a production of the perception of subjective color. This symptom means that a traumatic stimulus has caused a separation of a definite amount of nerve-energy, which specific quantity is transmitted and perceived as though it had been set into motion by a color-stimulus of external origin. If this traumatic stimulus should be continued for a few moments longer, then suddenly dropped, and the visual apparatus subjected to another act of traumatism, the second subjective visual result would be diminished by as much power as had been extracted by the first act of traumatism, and the answer would be equal to the amount of difference. If the primary irritating force should transmit all of the resident nerve-energy there would not be any perception caused by the second force. These rules hold good for any part of the visual apparatus, no matter whether the exciting stimuli originate in the ocular retina, the conducting nerves, or in the cerebral sheet. Under this category come the answers to the questions suggested by the production of subjective colors when the visual apparatus is not exposed to natural color-stimulus. For easy study there have been two subdivisions made: First, the production of the so-called complements when the organ of sight is in complete darkness; and second, the production of the so-called complements when the organ of sight is directed against a black surface. Practically, these two divisions are the same. The following example illustrates a cause coming under the first subdivision. A man walking in the dark suddenly strikes his eye against a heavy blunt obstacle. He has an immediate subjective perception of red flashes of light. A moment later his organ of sight encounters with much greater force a second

obstacle, and there arises a perception of a subjective green. Here there is a blow upon the outer tunics, followed by a stronger second one, each causing a *contre coup* upon the sensory elements of an equivalent nerve-energy power; the second blow or stimulus having arrived before a formative action for the amount of separated nerve-energy caused by the primary act has taken place.¹ If white light had been the primary subjective color there would not have been any subjective after-color.

Where subjective colors are produced by changes in cerebral structure, or in actions taking their origin within the limits of perceptive material, the same reason for cause and effect as expressed in the paragraph upon subjective color-changes originating from excitants taking their birth within the visual apparatus, must be accepted as truisms, although it should be strictly understood that when, in its studies, the human mentality approaches the domain of the cerebral forces, and demands answers as to the why and the wherefore of the physical changes and the physiological actions occurring within itself, it assumes a position bordering almost upon the search of the infinite. It must be agreed that there are two distinct changes taking place in the conversion of a sensation into a properly recognized perception. First, an action upon the lower mentality by the received sensory result, which has been spread upon the cerebral retina, causing a physical change in the contiguous cerebral material, with a production of the primary form of a perception. Second, a conversion of this automatic perception into a higher form through the action of a conveyed and everchanging quality of perception upon a certain amount of physical material resident near or in the centres of intelligence. These two actions constitute the direct order of the complete evolution of a color-perception as well as the last physiological rule of consummated vision. If it thus be accepted that the evolved perception of a completely sensitized color-energy passes through the same character of stations, and is subject to the same laws, although now of a higher grade of nerve material and cell-action, as it did whilst pursuing its course inwards as a sensation, and that similar acts of separation and re-formation as were attributed to the production of the completed form of color-sensation in the visual apparatus occur in the related perceptive elements of the cerebrum, it must be admitted that momentary alterations and transitory physical changes in these perceptive structures may happen in such a way as not only to produce subjective color-images, but actually to make the *ego* doubt the subjective quality. For instance, suppose the production of a subjective after-color upon a black surface, after the perception of a natural color stimulus. Here the second stimulation upon the perceptive color cells

¹ This example might be multiplied in many ways, and the stimulus made to originate in any part of the visual apparatus, but for proper explanation, this selection is thought to be sufficient.

must be of central origin,¹ because the moment the primary natural force is removed there is absolutely nothing external left to reëxcite the exposed peripheral terminals of the optic nerve. To explain: Suppose that a small square of red color be placed upon a dead-black surface, and a visual apparatus be allowed to fix upon it for several moments by the aid of a good light. Without moving the organ of vision from the point of fixing, have the red square suddenly taken away, and the light decreased to almost a minimum intensity, and there can be made to subjectively appear a green color upon the portion of the dead-black surface previously occupied by the red stimulus. In this experiment a portion of the energy material of the impinged optic nerve filament tip has been separated, evolved, and perceived as red; whilst a remaining nerve-energy material sufficient for the perception of a subjective complement of the transmitted and perceived primary nerve-energy has been left untouched. The acting sensory filament has been lowered to a transmitting power equal to the amount of nerve-energy left in its tip; whilst the internal termination of the filament upon the cerebral retina has been reduced in its power to an amount equal to the difference between its normal equivalent and the quotient of value of the perceived primary nerve-energy. The sudden removal of the natural stimulus, with the substitution of an area that is incapable of throwing out any vibrations of natural color, causes an immediate cessation of separation and transmission of the nerve-energy of the primary stimulus, with an attempt of formative action commencing in the peripheral tip of the abnormalized optic-nerve filament, and passing inwards throughout the whole connected extent of the sensory nerve. Before the restitution of the nerve-force material has reached the central terminus of the tip's filament, there has arisen an excitant in the cerebral cortex, either through will-power or emotion, which excitant has acted upon the acting central terminus of the optic-nerve filament, and caused a separation from the nerve-energy material remaining in the terminus; thus producing a perception of a subjective complement of the primarily perceived color. For obvious reasons, should the experiment have been tried with a square of natural white color, there would not have arisen any true "subjective after-color" at all. If the under larger surface had been gray instead of black, there would have been a visible area of subjective *darkness*, equal in size to the removed white square, because in reality in the above experiment of a white color upon a black surface there is as a result, in addition to the great amount of unused sensory nerve terminals, a small area of exhausted tips, which area is rendered invisible by reason of the non-employment of the surrounding nerve-tips; whilst in the latter experiment upon a gray ground there is a sufficient natural sensitizing material affecting the surrounding optic-nerve fibre tips to cause the area of non-

¹ This excludes internal forces that may arise in the sensory portions of the visual apparatus.

action to be perceptible. (Had the primary natural white stimulus been very strong, there probably might have been a series of passing subjective color changes.)

The same line of reasoning might be used if the primary stimulus had been of internal origin; the only difference being that in this case there would not have been any external stimulus whatever. This might be illustrated by placing the organ of sight in the dark, and causing a second cerebral stimulus to act upon a perceptive color-cell which had been lowered by some previous cerebral act.

All of these observations upon "subjective after-color," whether primarily produced from extraneous or internal stimuli, have dealt with the perceptive cells belonging to the most sensitive regions of either the ocular retina or the cerebral retina.¹ Experiments as to the possibility of the production of subjective after-colors through the peripherally placed cells² would be of value; although from the arguments brought forward in this theory it is certain that if sufficient intensities and large enough areas could be given to two complementary natural colors, or that two internal forces equivalent to those from the two natural complements could be aroused, so that their actions would be separately perceived by the eccentrically placed perceptive cell (as we know *is* possible), the subjective after-color of either of the natural colors or of the internal stimuli, could be provoked from the remaining energy of the primarily excited cell.

The other varieties of subjective after-colors are dependent upon modifications of the just described exciting agencies and conditions of physical material. It is for these reasons that no endeavors for their explanation have been given.

Fourth. Color-perception as caused by the action of internal stimuli upon nerve-energies which have not been lowered by any preceding act. Subjective Color. Under this heading come all those visible expressions of actions upon unused perceptive color-cells, through internal force set into activity by internal agencies. It differs from the preceding head in the fact that the color-perceiving cell has not been lowered in its individual forces by any previous act upon its nerve energy material. Here there is *not* a "remaining energy"; the energy is in its entirety, and ready to give subjective visible expression to any color that it has once known objectively. If the material of the nerve energy should be of the finest type, and its visible white of the purest variety, then the more individual color

¹ As this theory presumes a central as well as a peripheral expansion of the visual apparatus analogous to the roots and branches of a tree, it does not seem unjustifiable to speak of the most sensitive region of the cerebral retina, when it is remembered that the individual components of the two retinæ bear equivalent physical and physiological relations with each other.

² By "peripherally placed cells" is meant the probable position upon the cerebral cortex of those perceptive color-cells which are the internal representatives of the optic-nerve filaments of the circummacular regions of the ocular retina.

gradations it has under its jurisdiction, and the more subjective colors can be separated from it for perception. This presumes that there is no congenital or hereditary mental power, and that all mental force must have been derived from the external world. (The true reason of "Hereditary Genius" is, that one brain may have a more highly developed material structure, or a stronger physical substance devoted to certain mentalities than another brain, and that the first organ by an equivalent amount of physiological action as the second, may be productive of better work than its less fortunate companion; marking the possessor of the better built machinery as a remarkable "color-seer," or a fine "sound-hearer," etc. If the individual who possesses this better substance should persist in an avocation fitted for the constant use of such structures, he will cause rapid increase of physical material in the parts, and thus through extra powers of receipt and response be brought into eminence.) This is the true foundation of the superiority of one perceptive color-cell material over that of another similarly placed and used cell. This is the reason that there must be different grades of subjective colors dependent upon the strength of variously placed nerve energies and provoked internal stimuli, just as there were differences in objective colors dependent upon the value of the receiving fibre, as well as the amount and character of natural stimuli. Internal stimuli acting upon responsive perceptive material may be assumed in many ways, such as through sudden vascular changes, or by momentary pressures upon sensory tissue. That this is actually so, is fairly presumable from the everyday experiences of the victims of the visual types of either "conscious centric (or subjective) pseudopia," or "unconscious centric (or subjective) pseudopia,"¹ or of "Hallucinations," as Hammond² prefers to call them. Yet as it is neither in the province nor in the scope of this paper, to enter more fully into this part of the subject than will be sufficient for explanation of the causes of a few of the prominent varieties of subjective color, all others will be set aside, so as to allow deductions to be drawn from the chosen examples. The varieties will be primarily divided into two groups—the physiological and the pathological. The former will be treated of here, whilst the latter will be reserved for the third portion of the paper, in order that the various causative stimuli of abnormal nature may be placed in their proper and respective groupings.³

¹ These terms first made use of by Dr. Ed. H. Clarke, in an excellent, though unfinished essay upon "Visions: a Study of False Sight (Pseudopia)." Boston, 1878, 8vo., pp. 315.

² Divided into two kinds, "recognized" and "delusive." "Diseases of the Nervous System." By Wm. A. Hammond, M.D.

³ Strictly speaking, hallucinations occurring when the visual apparatus is impressed by natural color, as in ordinary daylight, should be considered as having been caused by actions upon remaining nerve-energies in previously impinged perceptive color-cells.

Physiologically, it does not matter in what internal situation the abnormal stimulus originates. If there should be a momentary attack upon any perceptive color-cell, there would be an immediately perceived action. For instance, the sudden appearance and disappearance of phosphènes from some internal momentary blow upon the region of perceptive color-cells, when the visual apparatus is either in a dark room, or when it is directed against a black surface.¹ Here there is a physiological action of a properly charged color-cell, from an abnormal process of stimulation. The physiological action of the cell is perfect, and the amount of action is dependent upon the force of the internal stimulus.

The same explanation holds good should an experiment be made by which a subjective color should be projected from an unused sensory filament upon a black surface, or into a dark space, during the time that its contiguous filaments are being exposed to strong intensities of natural color for some length of time; the only difference being that here there is a change in the kind of natural cause, and the character of its invasion. At first sight, it may appear as if it should in reality have been placed under the preceding head "subjective after color," but upon making separation of the reasons for the various manifestations, the proper situation will be found to have been chosen. Here there is a strong internal stimulus from the perceptive cell of the strongly impressed sensory filament acting upon the unused perceptive cell of the unimpinged second sensory filament, giving a definite and equivalent response in the perceptive cell of the second sensory filament. This does not in any way mean that there is an action of a "remaining energy" of the perceptive cell which has been impinged by the internal force, but that the internal stimulus from the primarily lowered perceptive cell is of a complementary type.

Reasoning from these lines of argument, it can be assumed as a certainty that the latter experiment might have been so modified as to cause subjective colors to appear to an unexposed second eye, because even here there is a definite amount, and a definable source of stimulus to attack the working material of the unused organ.²

¹ The origin of this force may have been external, as from a blow upon the vault of the cranium.

² At this point, "physiological research" is ended. In the concluding paper, which will appear in the April number of this journal, "pathological data in support" and a "*résumé*" will be given.

ARTICLE IX.

A CASE OF LODGMENT OF A BREECH-PIN IN THE BRAIN; REMOVAL ON THE SECOND DAY; RECOVERY. By G. W. H. KEMPER, M.D., of Muncie, Indiana.

ON the 19th day of April, 1884, Emerson McC., a robust farmer boy, aged 18 years, received a compound fracture of the frontal bone, immediately above the right frontal sinus, by a bursting gun. About noon, as ascertained from persons who heard the report of the gun, while the weapon was in position before his face, he fired at a squirrel. Four hours later he made his way, unaided, to his father's home. An investigation revealed the facts that the accident had occurred one-half a mile from the home, the gun had been broken into numerous pieces, and he had lain on the ground for a considerable length of time in an insensible condition. The hemorrhage had been moderate in quantity, and about half a teaspoonful of brain substance was found upon the leaves.

Dr. D. O. Munsey, of New Corner, the family physician, was summoned, and arrived about six o'clock. He found the patient suffering but little pain, and his mind was clear. Cold water dressings were applied—a critical examination of the wound being postponed for a consultation.

At 9 A.M. of the 20th—about twenty-one hours after the receipt of the injury—I saw the patient. The temperature was $104\frac{3}{4}^{\circ}$; pulse 64. He felt but slight pain, and the mental faculties were unclouded. He had slept well during the night. The tissues around the right eye were considerably swollen, and blackened with powder stains. A partially curved wound, about one and a half inches long, was located vertically above the right eyebrow. Raising the valve-like flap of skin, I found quite an aperture through the two plates of the frontal bone. Passing my finger through this and into the brain to search for any pieces of bone that might be detached, at a distance of half an inch beyond the internal plate, I felt a serrated object, and, guided by my finger, I introduced a dressing forceps, and seized and withdrew it—the breech-pin of a gun.

I presume the characteristic shape of the wound of the skin and soft tissues was made by the iron striking with its long diameter. After entering the cranial cavity the base of the pin advanced, and left the small end towards the point of entrance, and this was the point I first touched. Some five or six small pieces of detached bone were removed at this time, and two or three more, with a piece of his felt hat, worn at the time of the accident, appeared at the opening of the wound, several days later, and were removed by Dr. Munsey.

During all the time of my manipulations the patient made but slight complaint of pain—having refused to inhale an anæsthetic. The shape and natural size of the iron is shown in the accompanying cut (Fig. 1). The iron weighed 617 grains; length, $1\frac{1}{2}$ inches.

Water dressings were applied, and all facilities afforded for the ready escape of pus. No opiates were administered at any period. At the close of the dressing the pulse was 72.

From this date forward he was under the care of Dr. Munsey, who has kindly furnished the following memoranda of the case:—

April 21. 9 A. M. pulse 68; resp. 18; temp. 100.7°.

22d. 10 A. M. pulse 72; resp. 16, and irregular; temp. 100°. Slight delirium last night.

23d. Pulse 64; resp. 12; temp. 100°. The flow of pus became obstructed in the afternoon, and early in the evening he had a convulsion.

24th. Pulse 64; resp. 14; temp. 99.5°.

25th. Pulse 64; resp. 14; temp. 99°.

28th. Pulse 62; resp. 12; temp. 98.5°.

May 2d. Pulse 66; resp. 14; temp. 98.5°.

He made a rapid and excellent recovery, and was dismissed by Dr. Munsey on May 4th, at which time the pulse was 72; resp. 16; and temp. 98.5°.

The patient called upon me, at my office, on the 13th day of September, nearly five months after the occurrence of the accident. A picture, taken at this visit (Fig. 2), gives a good illustration of the appear-

Fig. 1.

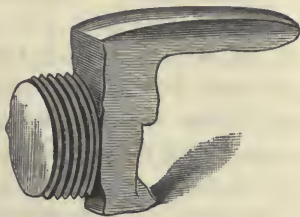


Fig. 2.



ance of the patient. The cicatrix showed no tenderness on pressure. The pulsations beneath it can be seen and felt. The vision of both eyes is perfect. A number of powder stains remain beneath and above the left eye. During the summer he has "felt the heat" so that he could not engage at active manual labor in the rays of the sun; otherwise he considers himself as well as he was before the accident. His memory is not affected.

Remarks.—It will be observed that no untoward symptoms were developed in this case until the evening of the 23d, when a convulsion ensued because of pent-up pus, and no further trouble followed after the removal of the cause. In the very interesting report in the AMERICAN JOURNAL OF THE MEDICAL SCIENCES (July, 1882, p. 45), of a somewhat similar case, by Dr. Noyes, of New York, he calls attention to the necessity of free drainage, and says:—

"It is not pretended that the most perfect provision for outflow of fluid will prevent an abscess from extending farther into the brain, and thus becoming fatal. But we certainly have to strive to remove all obstacles which tend to favor its extension. In the famous Harlow-Bigelow tamping-iron case, Dr. Harlow, in a private letter to me, says that it was due in great measure to the free outlets through the skull below and above that the man Gage owed his life."

ARTICLE X.

INTROSPECTIVE INSANITY¹ (*Folie du doute; Grübelsucht*). By ALLAN McLANE HAMILTON, M.D., one of the Consulting Physicians to the New York City Insane Asylum, etc.

AMONG those vague conditions of mental weakness in which there is slight derangement of the intellectual powers, yet a decidedly marked enfeeblement of the will, and an excitement of the emotions of a more or less limited kind, we find a variety of interesting psychoses which have within a comparatively recent period been considered under the names *folie du doute*² or *Grübelsucht*.³ These terms are applied to the condition of mind which is manifested by a morbid feeling of doubt and consequent indecision under the most ordinary circumstances, when both the doubt and indecision are unreasonable in the extreme, but the individual under the mandate of an imperative conception yields more or less to his disordered emotions. Some years ago we would speak of this condition of

¹ I have adopted this term because as far as I know there is no proper English word, and no Greek root can be found that will do. The morbid state of mind is essentially introspective, and its place is among the psychoses which include the second form of hypochondriasis of Bucknill and Tuke.

² Ball, L'Encephale, Nov. 1882.

³ Griesinger.

mind as "hysteria," or if it influenced the patient's conduct to any remarkable degree we would be at a loss for a proper explanation. Dr. Beard, before his death, in writing of *neurasthenia*, coined many long Greek words which he applied to the different forms of limited emotional trouble; and, since his time,¹ Hammond and others have with more or less success distinguished subdivisions of the disorder. It would be unnecessary to more than allude to the various exceedingly rare kinds of morbid *fears* which symptomatize the disorder. *Agoraphobia* (fear of spaces) is the most common, and has been described by Westphal,² Gélinau, Le Grand du Saule, Hammond, Benedikt, Tamburini, and others. Another form of trouble known as *Claustrophobia*³ was applied by Ball and Meschede to that state which is symptomatized by *fear of confined places*, great heights, and that vague discomfort and impulse to suicide which is experienced by those individuals who are exposed to peril, especially when the facilities for self-destruction are near at hand. This term in some respects is a misnomer, and only half expresses the condition.⁴ A vague and unreasonable fear of the elements may reach the dignity of insanity—for instance, Beard⁵ applied the term *Astraphobia*⁶ to the fear of lightning, and I have seen patients in whom the fear of fire or water has led them ultimately to do strange and disorderly actions. *Mysophobia* has been applied by Hammond⁷ to the dread of pollution or defilement. It would be possible with little trouble to prepare a list of names as formidable and curious as one of Rabelais's tables, or the roll-call of an Indian reservation, and the danger of making the subject equally ridiculous is very great. Rush first wrote upon morbid fears in the following quaint way: "These objects of fear are of two kinds—1. Reasonable. These are death and surgical operations; and 2. Unreasonable. These are thunder, darkness, ghosts, speaking in public, sailing, riding; certain animals, particularly cats, rats, insects, and the like."—*Loc. cit.*, p. 325. It cannot be denied, however, that while no refinement of diagnosis warrants the term "emotional monomania" invented by Hammond, the condition implies a limited emotional excitement of a depressing nature, and either as an element of primary insanity or as a precursor to some form of general intellectual

¹ A Treatise on Insanity, N. Y., 1883, p. 400 et seq.

² Archiv für Psychiatrie und Nervenkrankheiten, Band. ii., H. 1, p. 73, 1871.

³ De la Claustrophobia, B. Ball, Annales Médico-psychologiques, 1879, p. 378.

⁴ "Horreur du vide" was the term used by Bourdin.

⁵ A Practical Treatise upon Nervous Exhaustion, p. 29.

⁶ This disease, if it be such, was fully described by Rush. "A lady of respectable character, formerly of this city, usually fainted with terror during the time of a thunder-gust, and discovered, by a livid countenance, and cold and clammy sweats, the signs of approaching death. She was apparently kept alive by pouring into her stomach three or four glasses of Jamaica spirits; it was remarkable she was never intoxicated by it," etc.; also see pages 328, 329, 331.—*Medical Inquiries and Observations upon the Diseases of the Mind*. Phila. 1812.

⁷ Neurological Contributions, No. 1, 1879.

insanity (usually melancholia) its importance cannot be questioned. I have yet to see the case, however, in which for any length of time the insanity was confined to one range of subjects; the mysophobia is sooner or later connected with sexual perversion or religious delusions, and the claustrophobia becomes "suicidal insanity."

Tamburini,¹ whose reputation for analytical research and exactness is world-wide, classifies the different varieties of *delire du doute*, making six subdivisions: 1st. The metaphysical, which implies endless queries upon the part of the patient of a purely transcendental kind. 2d. The form which implies doubt about trifles, with indecision or suspended volition. 3d. "The scrupulous variety," which implies "morbid conscientiousness respecting matters unrelated to the domain of ethics." 4th. The form "in which the patient has a morbid fear of compromising himself by very unimportant acts." 5th. The calculating variety. 6th. The tactile variety, which includes mysophobia.

This grouping of the various manifestations of *delire du doute* is much more satisfactory than the formulation of Beard or others.

The state of mind which is manifested in morbid doubt determines to a greater or less extent the conduct of the subject. To the unbalanced discrimination is added a tendency to avoid the objects which act as emotional excitants, or to touch certain things—for no reason whatever usually, or because there is a source of impending danger—a penalty for the omission to do so. To this condition of mind the term *delire du toucher* has been applied. There are many eccentric or hysterical persons in whom there is no reason to suspect that insanity exists, who are impelled to gratify certain *tactile longings*, if such an expression is allowable. No less a personage than Ben Johnson was in the habit, in his daily walks, of placing his hand upon every door step or alternate door step, or every lamp-post, and if he missed one he invariably turned back. In such cases as this the performance is simply the relief of an active mind—an automatic act—when it is the result of a superabundance of energy—but such a condition may amount to insanity when it requires the entire attention of the individual, and becomes a voluntary act which involves painful reasoning with self.

We constantly meet with examples of what are simply regarded as "timidity" or "nervousness." In this category we find the young women who look under their beds or into their bureau drawers for concealed burglars. Such actions and others, when there is the knowledge of their uselessness, and when there is an imperative impulse to persist, may become so grave as to fill the individual with terror if he or she does not yield, and there may be actual mental distress and physical torture, which may completely demoralize the sufferer. This condition is closely

¹ *Revista Sperimentale e di Freniatria*, etc., see abstracts in *Journal of Nervous and Mental Disease*, Oct. 1883.

allied to the self-recrimination of the ill-balanced person of religious turn of mind, who fancies he has been remiss in some trivial duty.

Many cases of this kind have fallen under my notice both among women and men. I cannot regard them as unusual; I will, however, report two or three examples of introspective insanity, which are curious in the extreme, for the purpose of considering their etiology and treatment.

The first is one in regard to which I was consulted by Dr. E. H. Nicholls, of the U. S. Marine Hospital Service, and I shall make use of his letter. Dr. Nicholls wrote to me in September, 1884.—

CASE I. "The patient is a man 34 years old, apparently in good health and humor. Slightly built, typical nervous temperament, good figure, mathematical in everything he does, fastidiously neat in person, good address, and perfect manners, has seen much of the world, and is highly educated. Was in good health up to 1876, when he was subjected to an epidemic of yellow fever, although he did not contract the disease, but a protracted dyspepsia followed for four years. Dipsomania appeared, drinking frequently, and continuing until he was confined, and then he would taper off, and for two months would enjoy good health, then repeating the spree with the same result. He used tobacco, morphine, and alcohol, morphine (only at night gr. $\frac{1}{2}$). Five years ago he reformed every bad habit, and up to one year ago had none, when he again commenced smoking four cigars a day, which seemed to improve his digestion. He had never been in good health since '76. Neurasthenic in a marked degree, but his intelligence suppressed many outbreaks except the symptoms I will presently ask you about. His digestion is poor at times, causes change of diet continually; sometimes despondent, then emotionally elated; apparently he is healthy enough. Urine normal, sometimes phosphatic. Indulges twice a week with women. He had been living by the rule of arithmetic At times his passages look like putty. No pain in any part of body on pressure. There is no history of syphilis."

. . . . The doctor thus detailed his patient's peculiar mental condition. "While awake he has a nervous unrest, and in attending his duties something seems to dictate the particular direction of his walk, for example, if he comes to a stone or any object in the road, something seems to say, 'you must go to the right'—of the stone or object—or to the left as the case may be, and he is obliged to obey or there seems to his mind some severe penalty or unforeseen danger that will befall him if he disobeys in the slightest degree this despotic dictate. It not only happens in circumstances like the above, but in almost anything. In eating the same despot says, for example, 'you must eat that potato before you eat your rice,' or in dressing, 'you must put on your right shoe before your left,' or, 'don't turn that corner before you spit.' So he has to stop and spit before he turns. The most horrible penalties seem to hover about him, to fall upon him should he disobey these ridiculous suggestions. Mark, these only occur when on his feet or sitting. When in bed he sleeps well and feels well, but as soon as he touches the floor on rising in the morning these phenomena commence and continue all day unless mentally very much occupied."

I wrote to Dr. Nicholls giving the diagnosis "*Folie du doute*" with "*delire du toucher*," and suggesting moral therapeutics. A few weeks after the following letter came:—

"There are some other points I neglected to inform you about. This patient has had *mysophobia* to a marked degree for eight years, but not so much of late, two years. His personal appearance constantly occupying his attention, dusting his clothes, washing his hands, cleansing his teeth, fear of shaking hands with any one he suspects to be diseased, not drinking from cups used by others, morbid fear of venereal disease, a *folie du doute* annoys him. If he locks a door or trunk, he will return to see if it is done. Reading letters over two or three times. Hesitating which way to do things in. The *delire du toucher* he has almost conquered, as he thinks it all foolishness and cannot see any reason in it. Since your first letter the imperative impulses have diminished, as he has faithfully resisted their demands and no longer feels that punishment will follow his resisting the ridiculous promptings. Your letter encouraged him more than anything else, and I feel certain he will perform what he undertakes, notwithstanding the impulse continues some time longer. I presume his case is one of abortive monomania. About once a month his liver troubles him greatly; terrible indigestion. His stools very light colored and consisting of balls of various shapes." . . . Mercurials benefit him; this trouble seems to be connected with hepatic atony. The patient has always been hypochondriacal.

The following is a most extraordinary case of a sexual form of introspective insanity.

CASE II. Mr. M., is a young broker of twenty-three, who has led an active and rather fast life. He several years ago, when little more than a boy, married a woman older than himself, and lived with her for two years. Immediately after his marriage he was seized with doubts and fears regarding the stability of his happiness, and speculations whether he had done right in forming the alliance. He could not make up his mind, and being a man of few resources he busied himself in his exciting work, and stayed much away from home. For reasons which I have not clearly made out, but suspect were due to his desertion of his wife, she obtained a divorce, and according to his story he experienced a feeling of relief that was indescribable. About one year ago while at a boarding house he met a young woman of pleasing address, and within two months became engaged to her. He regretted the step almost as soon as he had taken it, and was unhappy in the extreme. There seemed no reason for his aversion, for she was pleasant and comely, but in his words, "I was drawn to her by a species of fascination I could not resist, although I had begun to abhor her." Months passed, and still he was tortured by doubts which rendered him miserable both mentally and physically. He grew thin and pale, and solicitous about his condition, and his fiancée asked for an explanation. Though longing for a severance of the ties, and according to his admission not restrained by any sense of honor—he felt that an explanation would bring some terrible calamity. Several times he went to Philadelphia, thinking that the change would bring rest and relief, but when he reached his destination he was filled with an irresistible longing to return. He would frequently after making arrangements to stay away for several days return by the first train, and sit outside of the house of his fiancée until dawn. His feeling was always one of *strong repulsion*. His conduct and procrastination so saddened the young lady that she counselled with her parents, and he was requested to fix a day. Upon the advice of a friend to whom he had appealed, he re-

turned to explain matters and seek release, but his good resolution changed and he chose the other course. Even the advice of a distinguished neurologist in another city whom he had consulted, and which he agreed to abide by, was disregarded almost immediately. He was married and was powerless to do his duty, and arose from the bed with a feeling of loathing and disgust for his wife. The next day he sought the society of a prostitute, and obtained immediate relief and pleasure. He spent several days with her, but the old feeling of attraction returned, and he again sought his wife. According to his story, he wished to spare her all pain, and tried to conceal his disgust. He admitted his condition of mind, and cried because of his weakness. It was alternate repulsion and attraction, a species of fascination.

The patient is a respected, honorable, amiable man, and with the exception of his infirmity is apparently sane. His relations with his business associate and with his own family are in every way creditable and proper. The patient's manner when I saw him was exceedingly restless, and his mental torture was so great that his physician to whom he had confided his secret feared he would commit suicide, whilst his distress lest his wife should know his feelings was genuine and sincere. I advised separation for a time, but when I last heard, I found he was not able to stay away from his wife. In this case there was history of insanity in the male line.

The following case is one possessing interest, from the fact that the individual came of neurotic stock, that his morbid mental condition was largely the result of early errors in education, and that his imperative conceptions were so powerful.

CASE III. Mr. V., a middle-aged man, is the son of parents of the insane temperament, and several cases of insanity among his ancestors have been known. These have as a rule been of the melancholic type. Members of the patient's immediate family are eccentric. At an early age he manifested evidences of an emotional temperament, and was always morbidly conscientious. His interpretation of the Scriptures was literal in the extreme, and the practical expression of his views rendered him ridiculous at school. Though possessed of manliness and courage, he frequently allowed himself to be whipped by other boys, submitting because he believed it to be his Christian duty, and afterwards spent whole hours in self-humiliation. In college he was a good student and much liked, and when he left he took a lively interest in worldly affairs, and seemed to be bright and gay. A sense of duty prompted him to study for the ministry, a profession which for many reasons was disagreeable to him. After his ordination he met and married a most charming, sensible woman. About this time (about twelve years ago) he conceived the idea that it was his duty to go as missionary to Africa, but this step was distasteful to him in the extreme. At the last moment he changed his mind, but no sooner had he done so than he became possessed with a new yearning to take the step. It was pointed out that he was not suited for the life, and for a time he seemed convinced, but the next day after a sleepless night he would bring himself to something like a fixed resolution, but it would fall to the ground, and apparently for no sufficient reason he would complain in great wretchedness of his indecision. Had this occurred but once or twice, no more importance could be attached to it

than to the vacillation of a weak man, but it has lasted for twelve years. He is daily troubled by this indecision. He endeavors to escape from things which suggest the all-absorbing thought, but he seems impelled to seek the society of persons engaged in missionary work, and of clerical friends, with some of whom he has gone over the same ground repeatedly. He goes to bed in an apparently peaceful frame of mind, but soon arises and goes to his library where he spends the remainder of the night in tears, arguing with himself. He leaves a concert room in the midst of the performance, or cuts short his horseback ride. At the table he without any apparent reason precipitately bursts into tears. A trip to Europe did no good. One day he would take measures to sell his house and put his affairs in order to leave the country for the field of his missionary work; the next he would change his mind. He is constantly in doubt. He has been forbidden to read certain books, but an irresistible impulse compels him to take them from their shelves. Up to a few months ago the patient presented nothing but the symptoms detailed. He was and is now a very intelligent and agreeable man, but lately he has several times spoken of suicide, and has been quite violent in other ways, so that measures of protection are necessary.

The last case is one of a familiar type, but somewhat unusual in its manner of expression.

CASE IV. Mrs. B. is a married woman of 38 years, whose father and other relatives died insane. A few months after the birth of a child, and after a perfectly natural labor, she left her bed. She was strangely nervous and tearful. With her husband she came to my office and told me her story. She had no worry and no cares, and had every reason to be happy, except that she was constantly possessed with the idea that she must do herself harm, as well as her child who slept in her room. She very clearly detailed to me the horrible fear that possessed her that she might kill her baby, and spoke of various plans that had suggested themselves. She could not bear the sight of cutting instruments of any kind and she pictured the keen blade of a knife crossing her throat. She perfectly knew the terrible nature of her doubts, and not feeling sure of her own self-reliance, ordered that all of these things be taken away from her room. Not only was she tortured by the idea that she might do herself harm, but she imagined in what way she might assassinate her husband or nurse. Her terror became so great that she ordered all the globes to be removed from the gas chandeliers, and the glass ornaments to be taken from the mantel-piece. When she rode in her brougham, she thought how easy it would be to break one of the windows and kill herself with the glass. Before she left home she substituted dull silver knives for those of steel she had been in the habit of using. In this patient there were symptoms of *claustrophobia*. She occupied a room in the upper story of a large hotel, where she was taken at my suggestion, and she confessed to me her frequent temptation to jump out.

In this case there were absolutely no signs of mental disturbance except that I have detailed. She was able to fully realize her horrible infirmity, and her grief lest she should be unable to resist her half-formed promptings was perfectly sincere. She became very miserable, reduced in flesh, anæmic, and suffered from gastric disorders of ner-

vous causation. Attacks of palpitation, flatulence, and sinking, with obstinate constipation, were present for several months. Her urine was free from albumen, but was loaded with phosphates and urates. Her tongue was furred in the centre and red at the edges, and her circulation was very defective. She ultimately recovered, though not perfectly.

This case is one of a most common class, and most likely to be misunderstood; I have known several suicidal lunatics whose trouble began first in this manner and was for a long time disregarded.

In these cases there was a history of insanity, and with the exception of that of Mr. M. the nervous temperament was manifested by various peculiarities, more often by a species of hypochondriasis, by peculiarities of temper, and by acts of eccentricity which caused the subjects to be looked upon as "queer." The history of dipsomania in the case of Dr. Nicholls's patient is suggestive, and though the immediate prospects for recovery are good, I am inclined to think that the possibility of development of some grave form of mental trouble is very great. I have already alluded to the difficulty of isolating these forms of morbid fear, I may add that I have noticed not only mysophobia as an early symptom of a very serious variety of chronic mental derangement, but *delire du doute* as well, and that too when there was no associated delusion. The "cursed spot" of Lady Macbeth was the somnambulistic mysophobia of an agitated mind. The fear of contamination which is found in the waking hours is of a different nature. I do not speak of those cases where the patient believes herself to be the anointed of God, and fears contamination, or to the patient who as the result of an hallucination believes his hands to be covered by spiders; but to the victim of unreasonable fears which are out of all proportion to real danger. Recrimination and remorse because of unperformed duties are familiar enough to all who have much to do with the insane. In one case of climacteric insanity that comes to mind, the condition of the patient in this respect was akin to the lighter trouble which I have considered as introspective insanity. In this case the patient frequently referred to certain days much after this fashion: "Ah, it is the twenty-third of April; had I not taken the step I did upon the twenty-third of March all would not now be useless." It seemed that upon the twenty-third of March she had taken food which she conceived had introduced a devil into her stomach. This reversion to days and anniversaries occurred frequently, and she accurately fixed certain occasions which were events more or less important, and her doubts and regrets were of the most painful kind.

ARTICLE XI.

POLIOMYELITIS ANTERIOR IN ADULTS. By GUSTAVUS ELIOT,
A.M., M.D., of New Haven, Connecticut.

To make the diagnosis of a rare disease, or of an uncommon disease occurring under unusual circumstances, is always gratifying to the physician. But of incomparably greater importance to both patient and practitioner is the selection of a plan of treatment which will remove the annoying symptoms. It is especially in diseases which, while they sometimes recover spontaneously, on the other hand more often are followed by protracted convalescence or incomplete recovery, that self-interest and humanity alike demand extreme care in the application of remedial agents. In the successful treatment of these cases one realizes the inestimable value of scientific therapeutics.

Less than eight years ago Dr. E. C. Seguin, of New York, published a small volume on *Myelitis of the Anterior Horns*. This included an analysis of forty-five cases of the disease, of which nine had fallen under the personal observation of the author, one had been communicated by Dr. G. M. Beard, three had been reported by Dr. W. A. Hammond in his *Treatise on the Diseases of the Nervous System*, one by Dr. D. F. Lincoln in the *Boston Medical and Surgical Journal*, and the remainder by various foreign authors. During subsequent years a number of cases have been reported in this country. Among those which have come to my notice are five by Dr. Wharton Sinkler, of Philadelphia, and two by Dr. Julius Althaus, of London, in the *AMERICAN JOURNAL OF THE MEDICAL SCIENCES* for 1878; and one each by Dr. J. Van Duyn, of Rochester, and Dr. A. Ranney, of New York, in the *Archives of Medicine* for 1884. Translations of works by Erb, Charcot, and Rosenthal also contain histories of cases.

The neurologists have at length established the possibility of the occurrence in adults of a form of paralysis closely resembling the well-known infantile spinal paralysis. Kussmaul, of Freiburg, and his pupil Frey, called it poliomyelitis anterior. It is now easy for a physician familiar with the literature of diseases of the spinal cord to make the diagnosis, if a case of this particular disease happens to consult him. Having myself had the good fortune to meet with such a case, I will introduce the history here.

Case of Subacute Poliomyelitis Anterior in an Adult.—Feb. 19, 1884. Mr. D. was born in Ireland, is twenty years of age, and has lived in New Haven two and a half years. There is no history of insanity in the family. His mother and sister are both living. His father died of consumption November 14, 1883. The patient was married July 3, 1883, and has no children. For several weeks his home has been in a basement. He denies having had venereal disease, as well as addiction to venereal excesses. He

has been in the habit of using a little alcohol, tobacco, and weak tea, and no coffee. He suffered from chills and fever three or four years ago, but has had no other illness. Since September 20, 1883, he has been employed as brakeman on a freight train, which every night runs sixty miles and return. While at the farther end of the trip he has often been obliged to run through snow and water so that his clothing became thoroughly soaked as high as the waist. For several weeks previous to the death of his father he lost a great deal of sleep taking care of him, and suffered a great deal of anxiety. Subsequently he had a severe cold. A year ago he weighed 185 pounds, but during the winter he lost flesh, so that before the present illness came on his weight was only 155 pounds.

For three weeks he has noticed a weakness in both legs, so that he tires easily when walking, and cannot go up stairs, climb a ladder, or step up on a car or into a carriage as easily as formerly. This symptom was preceded by what he describes as "a tightening of the sinews" in the calves of both legs. This was not a cramp, and did not draw his leg up, but "the sinews felt as if they were drawn up," and he "could not straighten the legs without feeling it." He did not experience this sensation when quiet, but only when he walked. In two days he could not run. In two or three weeks the trouble came in his arms, but they were affected somewhat differently. There was weakness, but no "tightening of the sinews." The legs, thighs, forearms, and arms all grew smaller. For two or three days there was a little formication in the legs and arms, but no pricking sensations. Two and a half weeks after the weakness was first noticed numbness came on. Now there is pain in the calves of the legs, and numbness in the legs from the knees down but not above, most marked behind, and in the hands below the wrists. Both sides are affected alike, and the arms were involved three weeks later than the legs. There has been no anæsthesia, no sensation of a band around the body, and no coldness or blueness of the extremities. He has had no chills. Two weeks after the weakness commenced he was "a little feverish" for a single day. There has been no unusual sweating. At first the skin was "dry and parched" for a few days. The numbness came on a week later. Three or four weeks before the loss of strength was first noticed there was diminution of vision so that he could not easily read a newspaper. This soon passed away. He is sleepy all the time, and sleeps a great deal. The bowels move every day, but not freely. Electricity has been applied twice by a quack. *R.*—*Ex. cascariæ sagradæ*, ℥ij; *tr. calumbæ*, q. s. ad ℥iij.—*M.* Sig. ℥j before eating.

26th. The patient took the medicine three times a day and finished it day before yesterday at noon. It caused improvement of appetite, and two or three loose painless movements of the bowels each day. It is now nearly a month since he noticed the first symptoms, and they are steadily increasing. The legs are growing weaker. The hands are not much weaker. There are no pains or cramps, only weakness. Some tremor is observable in the legs, arms, and tongue. Patellar reflex is absent. There is no anæsthesia. Once in three or four days he feels "a weakness across the kidneys." There is no œdema, and he has noticed no change in the urine. He sleeps well, and has had no headache lately. The tongue is broad and has a thin gray coating. Pulse 60. *R.*—*Pil. cinchonidinæ sulph.*, āā gr. ij, No. xxiv. Sig. one t. i. d., before eating. *R.*—*Sodii bromidi*, ℥ss; *sodii bicarbonatis*, ℥j; *tr. belladonnæ*, ℥ij; *aquæ*, q. s. ad ℥iij.—*M.* Sig. ℥j A. M. and P. M., ℥ij at evening, in water.

March 5. While taking the last medicine his mouth became dry, and the weakness increased more rapidly than before. He is now so weak that he can only walk a very short distance. Advised the application of strong mustard pastes over the back between the shoulders and in the lumbar region.

7th. After he stopped taking the belladonna and bromide, he ceased to grow worse. The involuntary muscular movements are gradually diminishing. On account of the weakness he has been obliged to keep quiet and not walk about much. Mustard was applied to rubefaction over spaces six inches square between the shoulders and "over the kidneys." R.—Liquor. ergotæ purificati, ʒvj; potassii iodidi, ʒiij; syr. sarsaparillæ comp., q. s. ad ʒiv.—M. Sig. ʒj t. i. d., in water. Recommend also bathing the limbs in hot water with salt and mustard, and rubbing them with whiskey.

14th. The patient finished the medicine day before yesterday. For three nights he bathed his limbs with whiskey. Then, commencing March 11, he used "gargling oil" four mornings and two nights. The last two nights he has used the mustard and salt in hot water as directed. The weakness commenced to go away March 10. The legs and arms are stronger. There is still numbness in both hands and feet. It is nearly all gone from the back of the legs. The bowels have moved every day but one; the appetite is good, and he sleeps well. Continue the treatment without change.

21st. The last of the medicine was taken yesterday morning. The patient has bathed his forearms and his legs to above the knees with whiskey twice a day, and has used no other medicine. He feels a great deal better, and is stronger in his legs and arms; the legs in particular are a great deal stronger, so that now he can go up and down stairs. The numbness is entirely gone from his legs, but not completely from his arms. His shoulders feel stiff. There is no headache, and no pain or weakness in the back. The stomach and bowels continue in good condition, and he sleeps well. Continue the same treatment as before.

28th. The patient took the last of the medicine day before yesterday in the morning. It did not perceptibly affect his head, stomach, or bowels. He has also rubbed his legs with whiskey. He continues to gain strength in his legs and arms. The numbness is all gone, except a little in the hands when he leans upon his arms. He went to work March 25, starting out on a freight train at 8.25 P. M., running sixty miles and return, arriving in the city at 6.35 A. M. He has only been out this one night, and was then assisted by his fellow-workmen. Afterwards he felt sore in his muscles, but otherwise no worse. R.—Liq. ergotæ pur., fʒss; potassii iodidi, ʒij; aquæ, ʒij; syr. sarsaparillæ comp., q. s. ad fʒiv.—M. Sig. ʒj t. i. d., before eating.

April 8. Finished the medicine day before yesterday. Continues to rub his legs once a day with whiskey. His weight, which when he was worst was reduced to 142 pounds, has increased to 161 pounds. There is still some weakness in the legs and arms, but no numbness. Since the last visit he has run on the train three times, and has done all his work. He can jump up on a car, or run up and down stairs, but is not as strong as formerly. He feels good in every way. R.—Liq. ergotæ pur., fʒiij; potassii iodidi, ʒiss; aquæ, ʒij; syr. sarsaparillæ comp., q. s. ad fʒiv.—M. Sig. ʒj t. i. d., in water.

22d. He has taken no medicine for a week, and is improving steadily. He has been running on the cars every night but one since his last visit. His natural strength is not fully restored, but is returning gradually. Last autumn he could lift 800 pounds, now he cannot lift 400. He can "jump around" almost as fast as ever, and do his ordinary work as well as ever. The arms and legs are a little slimmer than they used to be. There is no disturbance of sensation. The patellar reflex is still absent. Dismissed cured.

Aug. 17. With my friend, Dr. Frank H. Whittemore, I had an opportunity of examining my former patient. He is still employed as a brakeman on a night freight train, and has no difficulty in doing his regular work. His weight is 142 pounds; he thinks his limbs are as large in proportion to his weight as they ever were, but they are not as large as they were two years ago. There has been no change in his sexual feeling or power. The muscles of the thenar eminences are atrophied. His grip is very feeble for a man of his apparent strength. All the muscles of both upper and lower extremities respond to the faradic current. There are no disturbances of sensation. The patellar reflex is absent. He considers himself well, and dates the commencement of returning strength from the time when he began to rub his limbs with whiskey.

The progressive development of muscular weakness, unattended by febrile symptoms, but accompanied by diminution of the size of the limbs, by abolition of the patellar tendon reflex, and by sensations of numbness, yet without loss of tactile sensation, and without interference with the function of either rectum or bladder, renders the diagnosis clear and indisputable.

The history of the case seems to demonstrate the futility of indifferent treatment, the injurious effect of unwise and inappropriate treatment, and the beneficial results of a carefully selected and judicious plan of treatment. The patient continued to grow worse while he was taking a laxative with a bitter tonic, and the symptoms increased even more rapidly under the use of the bromide of sodium and tincture of belladonna. But when these remedies were discontinued, when rest was enforced by muscular weakness, counter-irritation was applied over the spine, stimulating frictions were employed upon the limbs, and ergot and iodide of potassium were administered internally, improvement was observed at once, and continued until the patient was able to resume his work. It is also interesting to note that the diagnosis was made, and the treatment successfully carried out without the aid of electricity.

When we recall how carefully the symptomatology and pathology of this disease have been studied, it is surprising that so little has been established as to the comparative value of the various remedies which have been employed in the treatment of the disease. One might easily be led, by some of the recent reports of cases, to suppose that treatment was a matter of secondary importance, and that, on the other hand, the minute observation of symptoms and electrical reactions was alone worthy of attention

and record. A large proportion of the reports of cases which have been published contain little or no information concerning the details of treatment, and in many others the multiplicity of drugs prescribed renders any reliable conclusions in regard to the effect of each almost impossible. Even Seguin, in his elaborate work, while discussing the treatment, abandons the analytical method, which led to positive conclusions in regard to symptomatology and prognosis; consequently the chapter on the former subject is less striking than the others, because its logic is less apparent.

A great variety of drugs has been used and recommended. Bromide of potassium, belladonna, strychnia, ergot, and iodide of potassium have been most often employed, and most praised. Counter-irritation, baths, rubbing and exercise, and electricity are also included as important elements in most plans of treatment.

The bromide of potassium, administered with ergot, is recommended by Dr. Sinkler. Of sixty cases (including the forty-five collected by Seguin), whose histories have come to my notice, the bromides were used in three. Dr. Sinkler gave, for eight days, to a case of one week's duration, ten grain doses of bromide of potassium, with half drachm doses of wine of ergot. At first the paralysis increased, but after three or four days there was improvement in all the muscles, and complete recovery finally resulted under the use of strychnia and faradism. A patient of Dr. Hammond, who for several months had had gradually increasing paralysis, took bromide of potassium in fifteen grain doses with the iodide of potassium and ergot. Here also at first the paralysis increased, but subsequently improvement commenced, and, electricity being also employed, continued for two or three months, when a relapse occurred. On this occasion iodide of potassium, ergot, hypodermic injections of strychnia, and faradism were used with considerable benefit. In my own case, as already mentioned, the bromide of sodium was given with tincture of belladonna, for a week, at the beginning of the second month of the disease, and during that period the symptoms rapidly increased. The evidence in regard to the value of the bromides in this disease is, therefore, entirely inconclusive; for, although it might be urged that, in the first two cases, bromide and ergot produced a beneficial effect, it will be shown later on that equally, and perhaps more favorable results follow the use of ergot without the bromide. On the other hand, it would be hardly fair to attribute the apparently unfavorable result in the latter case to the bromide, for it may have been due, in part at least, to the belladonna, to whose action the patient seemed peculiarly susceptible, and which was given in such doses as to produce physiological effects.

Belladonna, however, has received the indorsement of Dr. Seguin as a remedy useful in this disease. Two cases, beside my own, have been reported in which it was used. Soulier, quoted by Seguin, gave the extract

of belladonna, with iodide of potassium, to a man of fifty-seven years, who had been ill about two weeks. At the same time the actual cautery was repeatedly applied to the spinal region. Recovery followed. In a case which Dr. Seguin saw with Dr. T. A. McBride, a man of twenty-eight years was severely dry-cupped and took large doses of belladonna and ergot. Improvement soon commenced, and complete recovery followed. Here again the facts are insufficient to warrant any positive conclusion. In both cases the details of treatment are incompletely stated, and moreover, other remedies, viz., counter-irritation and ergot, were used, whose value is much less questionable. In my own case, in which belladonna was used with bromide of sodium, and pushed to the production of physiological effects with an unfavorable result, it is possible that the bromide alone might have proved innocuous. Under the existing uncertainty in regard to their therapeutic value, it would certainly be wise to be extremely cautious in the use of either drug.

Concerning the iodide of potassium, the evidence is more extensive. This drug has formed a part of the treatment in eleven cases. These may be divided for convenience of analysis into two groups, according as the remedy was employed in the early weeks of the disease, or after several months. In the case of Dr. Geddings, reported by Seguin, it is stated that the iodide disagreed after a few doses. In a case which came under the observation of Erb, two months after the first symptoms appeared, iodide of potassium was administered internally, and dry cups and cold compresses were applied externally. The patient soon commenced to improve, and ultimately nearly recovered. In one of Charcot's cases, quoted by Seguin, great improvement resulted in three months under the use of iodide of potassium internally and moxas to the spine. Soulier's case has already been mentioned, in which the use of iodide of potash with belladonna and the actual cautery, commenced at the end of three weeks, resulted in complete recovery at the end of three months. Dr. Hammond reports the case of a man of thirty-five years, who, on the fourth day of the disease, commenced to take iodide of potassium and ergot. The paralysis increased up to the seventh day, but improvement commenced on the ninth day. Afterwards electricity was employed, and at the end of a year no weakness remained. In one of the cases reported by Dr. Sinkler, the patient, a man twenty-three years old, on the fourth day was directed to take iodide of potassium and quinia. The paralysis steadily increased for five days, when the treatment was changed. In my own case the iodide was used in connection with ergot, counter-irritation, and rubbing of the limbs, commencing at about the sixth week, and with an immediately favorable result. In recent cases, therefore, it appears that iodide of potassium has proved of little value, except when employed with ergot or counter-irritation, or both.

Of the cases of longer standing, one reported by Hammond has already been referred to, in which after several months iodide of potassium was used with ergot and other drugs and electricity, with favorable results, both in the original attack and in a relapse. In the fatal case of a syphilitic woman twenty-six years old, reported by Déjérine and quoted by Seguin, the use of iodide of potassium was commenced at the end of three months and continued for five weeks, during which time there was slight improvement. Six weeks later the paralysis extended to the upper extremities, and after seven weeks the patient died. In a patient whom Dr. Sinkler saw after six months the iodide was used in connection with massage, faradism, strychnia, and codeia, and the patient improved. In another case, which the same gentleman treated after one and a half years, the drug was employed at the same time with massage and faradism. This patient also improved. In cases of long standing, therefore, iodide of potassium does not seem to have proved efficacious except when electricity has been used simultaneously; nor, on the other hand, does it seem to have prevented the improvement, or even complete recovery, which ordinarily attends the use of electricity.

Strychnia has been given in some cases. In one reported by Seguin a second attack occurred in a man aged twenty-one, who was taking strychnia for the relief of the weakness which remained from a former attack. Another patient, whom Hammond and Seguin both saw, "took strychnia for a time without any effect, good or bad." In several other cases, in which it was used, recovery was slow. While, therefore, it may not always do harm it may be said that its utility in this affection is not well established. On the contrary, there is reason to believe that sometimes it may do positive injury. Consequently it should be avoided.

Ergot has been considerably used and highly commended. In the case, already mentioned, in which Dr. Sinkler employed it in connection with bromide of potassium and the external application of a stimulating liniment, some muscles improved and others did not. When, however, electricity was added to the treatment all improved. The improvement was not interrupted by the substitution of strychnia for the other drugs, electricity being continued, nor later by the exchange of strychnia for ergot. Finally complete recovery resulted. Dr. Geddings took ergot for a time with no appreciable effect, but subsequently when counter-irritation and galvanism were used at the same time, complete recovery followed. Dr. McBride's patient was severely dry-cupped, and took large doses of ergot and belladonna. In a few months all paralytic symptoms passed away. Dr. Hammond used the drug in three cases. One patient, a woman of twenty-seven years, having already improved somewhat, after two months was treated with ergot and electricity, and completely recovered. The two other cases were mentioned in speaking of iodide of potassium. In one of

these ergot was given with the iodide, and after there was some return of motility electricity was used until complete recovery resulted. In the other, ergot was given with the iodide and bromide of potassium, and after improvement commenced electricity was employed in addition. After several weeks a relapse occurred which was treated with ergot and the iodide of potassium, with hypodermic injections of strychnia and electricity. The patient improved greatly, although some atrophy of the muscles persisted. In my own case, under the use of ergot and iodide of potassium, with counter-irritation and rubbing of the limbs, the patient improved rapidly. There is, therefore, considerable reason for believing that ergot is useful in this disease. It seems to have done no harm, but, on the contrary, to have been beneficial in all the cases in which it was used. There was, moreover, no other element of treatment common to the cases enumerated, while, on the other hand, in some of them it was used with drugs, whose value is, to say the least, questionable.

Naturally, since most of the cases reported were treated by specialists in nervous diseases, electricity has been employed more frequently than anything else. It has been used early and late, and in the forms of both galvanism and faradism, generally with favorable effects. The only apparent exception is the case of Dr. Lincoln, in which the faradic current was applied from the fifth to the twenty-first day, during which time the paralysis increased. The galvanic current was then tried and continued until recovery, which commenced about the twenty-fifth day. This patient also took strychnia. More frequently electricity has been first used after the paralysis has ceased to increase, and then it has always seemed to promote recovery. Often in old cases great benefit has resulted from the use of the faradic current, when it is capable of inducing contractions in the affected muscles. Otherwise galvanism is more efficacious.

Counter-irritation has been employed in many cases which have resulted favorably and in some immediate improvement has followed.

Massage of the affected muscles, and rubbing of the extremities involved, have also been employed, with apparent advantage, in many of the cases which recovered.

Finally, it must be mentioned that, while a few cases have not proved amenable to treatment, some, on the contrary, have entirely recovered, or markedly improved, without any treatment.

The following conclusions are drawn from a study of the results of various plans of treatment as reported by different observers.

First. Counter-irritation and ergot should be employed early in every case.

Second. Massage and electricity should be used as soon as there is any evidence of improvement.

Third. Little, if any, effect can be expected from iodide of potassium.

Fourth. Belladonna and the bromides should be used only with extreme caution.

Fifth. Strychnia should be entirely avoided.

The value of these conclusions is greatly impaired because they are based on a small number of cases, and because the effect of any particular remedy is obscured by the possible effects of others which were used at the same time. Consequently it is exceedingly desirable that new cases should be reported as they occur, and that in all reports the details of treatment, whether successful or unsuccessful, should be stated more definitely than has hitherto been customary.

SEPTEMBER 25, 1884.

ARTICLE XII.

OBSERVATIONS ON THE REGENERATION OF THE VAGUS AND HYPOGLOSSAL NERVES. By EDWARD T. REICHERT, M.D., Demonstrator of Experimental Physiology and Experimental Therapeutics in the University of Pennsylvania.

SINCE the time of Fontana the subject of the regeneration of cut nerves has been one of great interest and importance, and some experimental work has been done with more or less success.

At the present time there seems to be no difference in opinion as to the fact that fibres of the cut ends of nerves will unite with similar fibres; that sensory fibres will reunite with sensory fibres, and motor fibres with motor fibres, and that as a result the regenerated sensory nerve will still convey sensory impulses and the regenerated motor nerve motor impulses. In the case, however, of the regeneration of sensory with motor fibres there yet exists considerable uncertainty. The well-known experiments of Bidder, on the lingual and hypoglossal, are without value in proving that sensory and motor fibres can regenerate because he neglected to so prepare the cut ends of the nerves as to prevent reunion of similar fibres, and as a consequence, in most of his experiments, the four cut ends of the nerves were found imbedded together in a mass of inflammatory matter, so that it was impossible to tell in what manner the fibres had reunited; while in others, the lingual had reunited with its mate and the hypoglossal with its mate, but never was it clear that the fibres of the lingual and hypoglossal had become united. Both Vulpian and Rosenthal have thought that they were successful in uniting motor fibres of the hypoglossal with sensory fibres in the lingual, but even these investigators no longer insist that there was a reunion of sensory with motor fibres. Nor have the experiments of Vulpian and Phillipeaux been attended with any better success. They made two experiments on young dogs, in which they joined the cen-

tral end of the vagus with the peripheral end of the hypoglossal. The animals were examined after death two months succeeding the operation, but not during life. Upon examination of the sutured nerve they found that the ends of the two nerves were united by filaments of connective tissue (only one filament in one dog), which in their opinion contained no nervous matter. They did not find any properly regenerated fibres in the hypoglossal trunk, only thin fibres, like newly-formed nerve-fibres, in which the medullary sheath was scarcely developed, and they regard it as a regeneration independent of reunion.

Notwithstanding the universal failure to unite sensory with motor fibres, there are a number of German physiologists who still believe that such regeneration can occur. Schiff has, however, made a long series of experiments, which are not yet quite completed, in which he has fully satisfied himself that it is impossible to unite sensory with motor fibres. A specimen from this series was exhibited by him at a meeting of the Society of German Naturalists some years ago, in which it seemed from the appearances of the nerve trunk that the hypoglossal and lingual had actually become united, because the restoration of the trunk at the point of union of the two nerves had been so accurately performed during the healing process that there was scarcely an appreciable enlargement, but microscopical examinations showed that all the internal fibres of the lingual going to the mucous membrane were degenerated. He, however, did find a few regenerated fibres which proved to be vaso-motor. In not a single instance has he been satisfied that sensory and motor fibres will unite.

The experiments recorded in the present paper were made to learn if the fibres of nerves of entirely different origin and function would unite, and if regeneration should occur to know the form of the return of function, or, in other words, to know if a motor nerve was capable of conveying impulses peculiar to another motor nerve.

The importance of the latter part of this statement can better be appreciated when we consider the results of some recent experiments published by a Russian (I have not seen the original paper) on the regeneration of the nerves of the extremities. These experiments were made on various animals in which different trunks were united, and it is stated that after regeneration of the nerves the animals were still able to perform normal coördinated movements. This result seems so incredible that there is some strong probability of faulty observation, for it is obvious that if such a condition should exist the centre must have undergone such alteration in function that impulses having an entirely different object are now transmitted by the peripheral end of the nerve to the muscles—as, for example, the centre, which before generated and transmitted impulses at a certain time to extensor muscles, must now supply flexor muscles, and as a consequence in order that there may be coördinated movements must supply impulses at a time directly opposite to the normal. Is it possible?

In the present experiments the vagus and hypoglossal were selected as being nerves of distinct origin and function, and which, in case of regeneration, would probably afford the best facilities for accurate observation. Five dogs were accordingly prepared during the last week of February by Prof. Schiff, in which he cut the hypoglossal on one side close to its exit from the cranium and the vagus at the thyroid. The peripheral end of the vagus was then cut off as low in the neck as the wound permitted. The sections of the nerves were all made with a razor or very sharp scissors, and the peripheral end of the hypoglossal was sutured to the central end of the vagus in each case by means of a stitch of raw silk from the cocoon run through the neurilemma with a very small needle. In some cases the loop of nerve was so long, that a small portion of one or both nerves was cut off.

The usual atrophy of the side of the tongue and tremor which occur after section of the hypoglossal were observed in all of the dogs, but from the eleventh to the sixteenth week after the operation, Prof. Schiff noticed localized areas of contraction, in which contraction was distinct from any general movements of the tongue. The degree of contraction in these areas gradually increased until the middle of the sixth month following the operation, when I examined the dogs and made the observations recorded in this paper. Simple section of the hypoglossal was made in other dogs at the same time, in February, in order to compare the two sets; but never in these dogs were any of the localized areas of contraction observed, as were seen in the dogs with the sutured vagus and hypoglossal. At the middle of the sixth month following the operation the following notes were made:—

In all of the dogs there is atrophy of the side of the tongue corresponding to the operation equal to a loss of about one-fourth of the normal size. The anterior third of the atrophied side is marked by numerous shallow fissures, having, for the most part, a direction outwards and forwards, somewhat radiating, and gradually fading away towards the edge of the tongue. These more prominent fissures have between them, and are frequently intercepted by, smaller fissures, giving the surface of the tongue somewhat the appearance of the surface of the cerebral convolutions. The posterior two-thirds are marked by numerous pit-like depressions, some of which are deeper than others, and which are scattered with much uniformity. The appearances of this side of the tongue are quite characteristic when compared with the general rounded, smooth, and regular form of the normal side. When the tongue is protruded, it is towards the diseased side, and when drawn in, it is towards the normal side. The diseased side is altogether without the movements produced by the active hypoglossus. Over the whole of the surface of the operated side of the tongue, but more particularly along the edge of the anterior third and the whole of the posterior two-thirds, is seen a general tremor of a decidedly

metastatic character. This tremor flits from point to point, but there are always so many points in tremor that the surface of the side of the tongue has a general tremulousness, and there do not appear to be any distinct isolated points which are entirely free from tremor for any more than a few moments at a time at most. The tremor is generally quite superficial in character, but at times is considerably exaggerated in depth, and has a character not unlike decided, but rapidly repeated muscular contractions. The tremor is greatly modified by various circumstances, as, for instance, it is increased by excitement, movements of swallowing, and vomiting.

Besides the tremor other abnormal contractions are observed which are quite extraordinary in character. These are seen in certain isolated areas which are clearly outlined, and are of a very distinct, slow, rhythmical character very different from any general movements of the side of the tongue. These contractions are seen in all of the dogs, and by placing the hand upon the chest and observing the contractions in these areas an unmistakable relation is apparent between the rhythmical contractions in the tongue and the movements of respiration. These movements, in both cases, were recorded graphically in two ways—first, by recording the respiratory movements by means of a Marey's pneumograph connected with a recording tambour writing on a revolving drum, and simultaneously recording the movements in any one selected area in the tongue by making and breaking of the current with a telegraph key which was connected with a chronograph, which also recorded on the drum on the same vertical line as the lever of the tambour; second, by using the pneumograph and tambour as above and recording the contraction in the side of the tongue by fixing to the edge of the operated side of the tongue a Kronecker's muscle forceps which was connected with the lever of a tambour, which tambour in turn was connected with a recording tambour marking on the drum below the tambour recording the thoracic movements. In the first method of recording the telegraph key was pressed upon by the finger at the commencement of contraction causing elevation of the pen of the chronograph and released at the cessation, causing depression of the pen. In the second method records were made of both sides of the tongue for comparison in order to obviate any fallacy likely to arise from general movements of the tongue.

As the areas of contraction as well as certain characters of the contraction vary in the different dogs it will be necessary to record the observations in the different animals *seriatim*.

In dog No. 1, two distinct areas of contraction are seen, one on the edge of the tongue at the junction of the anterior and middle thirds, and extending inwards for about 5 mm; the second an oblong area in the posterior internal part of the middle third, and about 1 cm. in length by 4 mm. in breadth. When contraction occurs in the first area the edge of the tongue is drawn inwards, and when at the latter point the surface of the

tongue is decidedly depressed. Both of these movements occur simultaneously with *expiration*. (See *Fig. 1* and *Tracings 1* and *2*.)

Fig. 1.

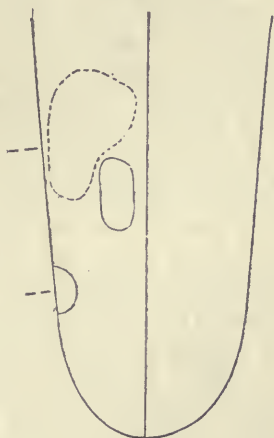
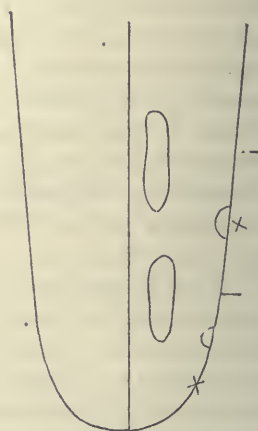


Fig. 2.



In dog No. 2, five distinct areas are observed, one of which is situated at the junction of the anterior and middle thirds, and one at the junction of the middle and posterior thirds, each being a little over a centimetre in length by 3 or 4 mm. in diameter and situated a little within the middle line. A third area is situated on the edge of the tongue about 5 mm. anterior to the point of junction of the anterior and middle thirds. At these three points contraction occurs consentaneous with *expiration*. One of the remaining areas is situated on the edge of the tongue in the middle third, and the other on the edge of the tongue about 1 cm. anterior to the junction of the anterior and middle thirds. At these points (marked x) contraction is simultaneous with *inspiration*. (See *Fig. 2*, *Tracings 3* and *4*.)

In dog No. 3, one large area of contraction was observed situated in the middle and posterior thirds about 1.5 cm. long by 5 mm. wide; also, two small areas at the junction of the anterior and middle thirds situated on the edge of the tongue about 5 mm. apart. At all these points contraction was in relation with *expiration*. In areas marked x contraction is observed in deep expiration. (See *Fig. 3*, *Tracing 5*.)

In dog No. 4, in the middle and posterior thirds of the tongue, are three lineal areas, two of which are parallel with the raphé, and situated about 3 mm. from it, and a third lineal area of small extent in the posterior part of the posterior third running backwards and outwards (*Fig. 4*). The contractions in these areas are quite distinct in their character from those occurring in the other dogs, for instead of being a single tonic contraction there are successive contractions rapidly following each other

such as are observed when a muscle is irritated by ten or twelve induction shocks per second. In ordinary respiration there are but two contractions, but in deep breathing the series may consist of three or four. These con-

Fig. 3.

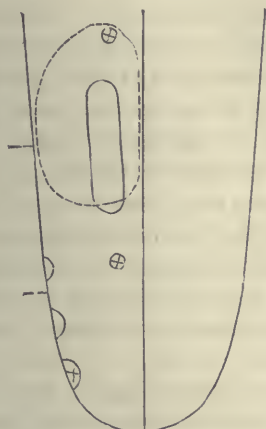
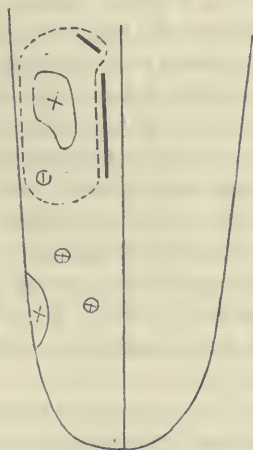


Fig. 4.

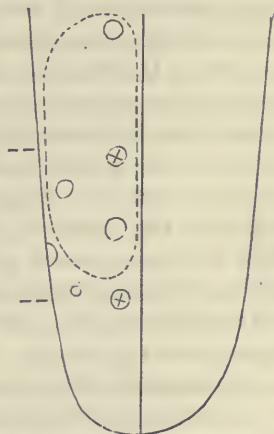


tractions always occur with *inspiration*. In deep inspiration five other areas are observed (marked x), one of some dimension in the posterior third, two in the middle third, and two at the junction of the anterior third—one on the edge of the tongue and one near the middle of the line, all of small dimensions. (*Tracing 6.*)

In dog No. 5 are seen five areas in which contraction occurs during *expiration*. One is situated in the posterior part of the posterior third and four in the middle third, one near the edge of the tongue, 5 mm. from the junction of the posterior third, one on the edge near the middle, one near the edge at the junction with the anterior third, and one near the middle close by the raphé. The five are all of small dimensions. (*Fig. 5, Tracing 7.*)

There are also two small areas, one in the middle third touching the junction with the posterior third and near the raphé, and the second near the raphé at the junction of the middle and anterior thirds (marked x), in which contraction occurs simultaneous with *inspiration*. (*Tracing 8.*)

Fig. 5.



In all the dogs the respiratory movements in the tongue were greatly

modified by various circumstances. In quiet breathing the contractions were shallow, and in dog No. 4 were scarcely to be seen. In deep breathing they were greatly exaggerated, while in rapid, panting breathing, such as is caused by running the dog in the sun in hot weather, they are diminished or altogether lost. Coughing always increases the degree of contraction in the expiratory areas.

After section of the normal vagus the respiratory movements became slow and labored, and all the characteristics immediately following simultaneous section of both vagi were present. The respiratory contractions were enormously exaggerated, especially in the inspiratory areas, and many more small areas of contraction were noted which before were unappreciable. When the central end of the cut vagus was irritated by a rapidly interrupted current the frequency of the respiratory contractions were increased corresponding to the increased frequency of the thoracic movements. (*Tracing 9.*) Stimulation of the superior laryngeal causes slowing of the respiratory contractions in the tongue and thorax. (*Tracing 10.*)

When the vagus of the regenerated side was cut near its exit from the cranium the rhythmical movements on the side of the tongue immediately cease, and the side of the tongue is without any movements peculiar to the muscles of that side of the tongue. If the peripheral end of the cut vagus is irritated by a rapidly interrupted current, contraction occurs in the side of the tongue at the areas in which the contractions corresponding to respiration were observed. In one dog the peripheral end of the vagus was not excitable by even a maximal current although the trunk of the hypoglossal to which it was united was excitable to a very moderate current—a condition before observed by physiologists where a nerve was not excitable by electrical stimulus yet functionally capable. When the same hypoglossal trunk was electrically excited by applying the electrodes about 1.5 cm. from the point of union with the vagus not only was contraction induced in the respiratory areas in the side of the tongue, but the respiration was increased in frequency and depth, while the blood pressure was diminished but without any decided effect in the heart. (*Tracing 11.*) With a stronger current the respirations were greatly increased in frequency, the blood pressure lowered to a greater degree, there was decided inhibition of the heart, and immediately after the cessation of the irritation vomiting ensued. (*Tracing 12.*) These observations were several times repeated in the dog and always with the same result, and from them we must infer that some of the sensory fibres in the hypoglossal had become united with similar fibres in the vagus, and that impulses generated in the hypoglossal were conveyed through the sensory fibres of the vagus the same as normal impulses from the vagus peripheries and with the same effects on the nerve centres. Unfortunately this observation was only made on the last dog killed.

Besides the extraordinary movements above described others were noted

of a not less interesting character nor less remarkable. Thus in four of the dogs very peculiar contractile movements were observed during the act of swallowing. In order to observe them the dog's mouth was held firmly open and water was injected or poured into the back of the mouth, or pieces of bread or meat pushed back to the pharynx when he was forced to swallow. When swallowing occurred a series of contractions were seen in areas in the posterior and middle thirds of the tongue (shown in the diagrams by the broken lines) which were characterized by distinct contractions in numerous small points, the contractions occurring in sequence and seemingly running into each other, giving the whole series a somewhat vermicular character. In this play of movements the individual contractions followed each other so rapidly that it was not possible to map out any distinct order of the contractions in the several points. These swallowing movements seemingly occurred during the passage of the food down the œsophagus, and were very slight in degree when the animal made a simple swallowing movement; they were more distinct when water was swallowed, especially so if the quantity was large; they were very marked during the passage of meat or bread, and were intensified in proportion to the bolus. In dog No. 2 no swallowing movements were observed, and in dog No. 5 they were more decided than in the others.

A similar play of movements was also observed during the act of vomiting and in exactly the same areas. The plan pursued in studying the vomiting movement was to feed the dog on pieces of bread or meat and then produce vomiting by means of hypodermic injections of apomorphine. For a few minutes preceding emesis distinct movements similar to those observed during swallowing were seen and which were due to the swallowing of air or saliva. During retching there was a decidedly contracted condition of the side of the tongue with each effort at expulsion, and during the act of vomiting, apparently during the passage of the food up the œsophagus, the play of movements was beautifully marked, and even after the mass of the contents of the stomach was ejected from the mouth the movements oftentimes continued for a few moments, and were, no doubt, dependent upon continued regurgitant movements in the œsophagus. In dog No. 2, in which no swallowing movements were noted, no vomiting movements were observed, and in dog No. 5 both the swallowing and vomiting movements were very decided. The vomiting movements produced by mechanical irritation of the pharynx, by digitalis or atropine, did not possess any appreciable difference from the vomiting produced by apomorphine. No distinct movement corresponding to dilatation or contraction of the œsophageal sphincter could be detected.

The dogs were also repeatedly examined with great care to discover contractile movements in the tongue which might be consentaneous with movements of the heart, but only in two dogs (Nos. 3 and 5) could any connection be detected and even in them not with any degree of satisfaction. In both of these dogs there were several points along the edge of

the tongue, in the anterior and middle thirds, at which contractions occurred which appeared to be simultaneous with the movements of the heart, and even after the heart beats were considerably reduced by the use of liberal doses of digitalis the connection was still only probable; but never could there be counted together more than three or four contractions which were simultaneous with the movements of the heart before the constant tremor in the side of the tongue would interfere with the count. It was not, therefore, satisfactorily determined that there were movements simultaneous with the heart beat.

At the end of the sixth month and beginning of the seventh month after the operation the dogs were all killed (excepting dog No. 5, which died during that time from the effects of digitaline), and observations made on them such as were already recorded in connection with the respiratory movements. After death the regenerated nerves were carefully examined. In—

Dog No. 1.—Neither the hypoglossal nor vagus were at all wasted, when compared with the normal nerves. At the point of regeneration there was a slight fusiform enlargement about 2 mm. greater in diameter than the nerve trunks. The lengths of nerve from point of regeneration to the tongue, 5 cm.

Dog No. 2.—The hypoglossal was atrophied to about one-half of its normal size and the vagus but little. Where the vagus and hypoglossal were united, there was a small oblong thickening about 1 cm. long and 0.4 cm. wide, together with some thickening of the connective tissues about the nerve. The length of the hypoglossal trunk from point of union 7.5 cm.

Dog No. 3.—The hypoglossal was wasted about one-third of its normal size and the vagus slightly so. At the point of junction of the two nerves there was very little thickening. Length of hypoglossal trunk 4.5 cm.

Dog No. 4.—Neither the hypoglossal nor vagus was at all atrophied. Where the nerves were joined there was a triangular thickening the angles of which being formed by the peripheral ends of the hypoglossal and vagus and the central end of the vagus. The thickening was about 1 cm. in diameter. The length of the hypoglossal from point of reunion 5.5 cm.

Dog No. 5.—The hypoglossal was slightly atrophied and the vagus wasted to about one-half of its normal size. At the point of reunion of the two nerves there was a round flattened enlargement about 0.7 cm. in diameter. The length of hypoglossal nerve 5 cm.

Microscopical examination of the hypoglossal trunks of the regenerated nerves showed that they contained few degenerated fibres and large numbers of small fibres having little medullary sheath.

From the above observations it seems obvious that the motor fibres of the vagus in all of the five dogs operated upon had actually become united to similar fibres in the trunk of the hypoglossal, and that the hypoglossal

fibres conveyed impulses which were peculiar to the vagus apparatus. Moreover, that in at least one dog (the others not being examined in this way) irritation of the sensory fibres in the hypoglossal trunk gave rise to impulses which were conveyed by the sensory fibres of the vagus to the vagus centres, and produced effects like those induced by excitation of the vagus trunk, thus showing in both instances that a motor or sensory nerve can convey impulses peculiar to another motor or sensory nerve of entirely different origin and function; and indicating that at least in some nerves the effects produced by impulses from the periphery are not dependent upon any peculiarity of impulses due to physiological peculiarities of the peripheral sense-organs or nerves through which the impulses are conducted, but upon the peculiar physiological properties of the nerve centres, hence we have respiratory movements, etc., occurring in the tongue brought about by impulses from the vagus centres through the hypoglossal nerve, and effects on the respiration, pulse, pressure, and vomiting centre, through impressions carried to the vagus centres by impulses generated in the hypoglossal.

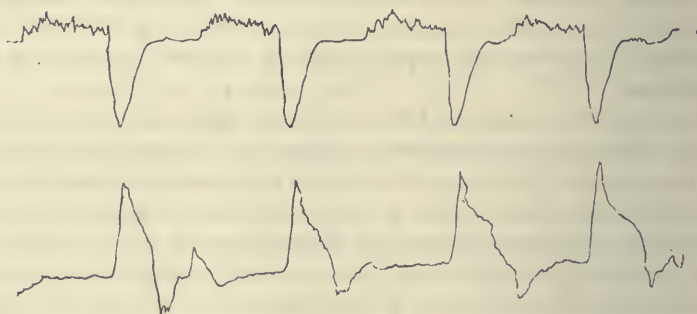
Not only do we find motor fibres of distinct origin and function united, but we find among the vagus fibres at least three physiologically distinct sets of motor fibres united with fibres of the hypoglossal, viz., fibres conveying *inspiratory* impulses, fibres conveying *expiratory* impulses, and fibres conveying *oesophageal* impulses, the first two sets no doubt consisting of fibres of the vagus going through the recurrent laryngeal to the muscles of the larynx, and the latter set forming part at least of the fibres belonging to the same branch.

Another interesting fact to be noted is that the sensory fibres in the trunk of the hypoglossal at the point of union with the vagus in these experiments, are recurrent fibres (sensory fibres coming from the superior cervical nerves through the descending branch of the hypoglossal and running from the branch towards the centre), and accordingly conduct impressions normally not directly toward the centres, as is commonly the case with sensory nerves, but first peripherally making a circuit, as it were, before reaching the centres; therefore, since the sensory fibres in the hypoglossal which united with the sensory fibres in the vagus, conducted impressions to the vagus fibres, it is obvious that these impressions were conducted in a direction opposite to that of the normal, thus offering corroborative testimony to the very interesting experiment of Paul Bert in showing that sensory fibres can convey impressions in both directions. This experiment of Prof. Bert is one of such interest that it may be quoted with profit. He laid bare a portion of the back of a rat, and also a part of the end of the tail, and caused this end of the tail to grow to the back. After reunion was accomplished, the tail was cut from the body at the root, so that it was now only connected to the body by the end of the tail grown to the back. He now found that when he irritated the end of the tail, which was formerly the root, the animal gave

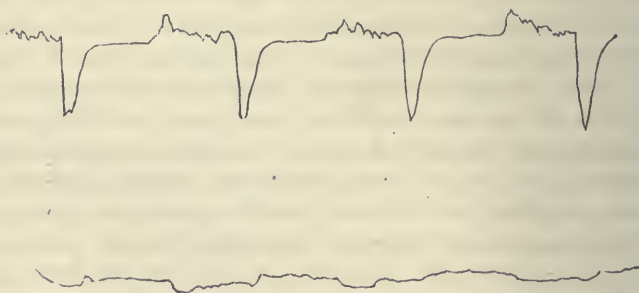
signs of pain, thus showing that the impressions were conveyed in a direction directly opposite to that normally, or, in other words, that the nerve which formerly conveyed impulses from the end of the tail towards the root, now conveys impulses in an opposite direction.

Explanation of Tracings 1 to 10.—In all of these tracings the upper tracing represents the movements of the thorax, the rise of the marker corresponding to inspiration; the lower line represents the time of the occurrence of the contraction in an observed area in the tongue, the rise of the marker corresponding to contraction. In tracings 3 to 8 inclusive, the first method of recording (p. 149) was adopted, and in the others the second method.

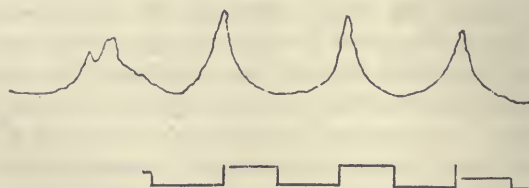
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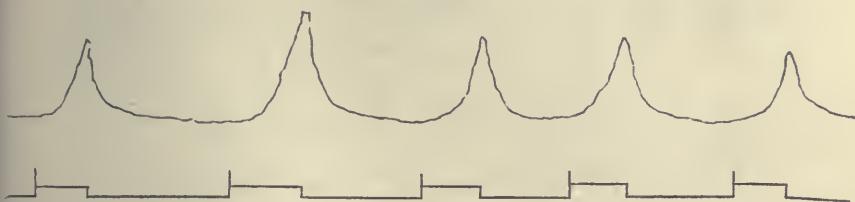
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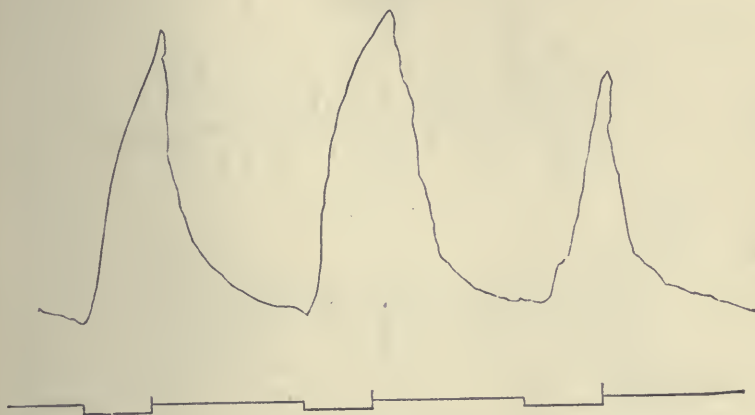
Tracing 3.



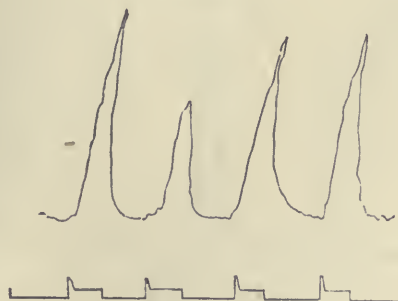
Tracing 4.



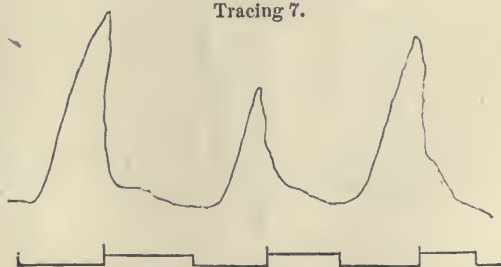
Tracing 5.



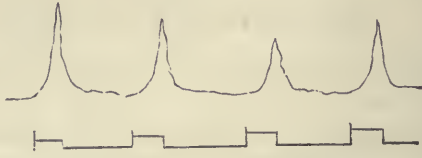
Tracing 6.



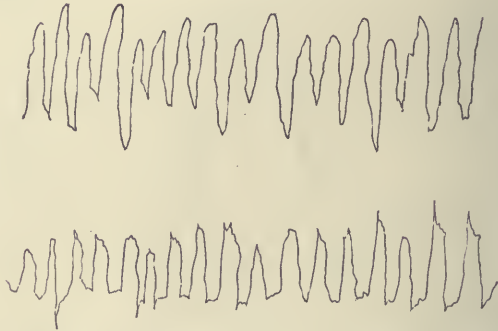
Tracing 7.



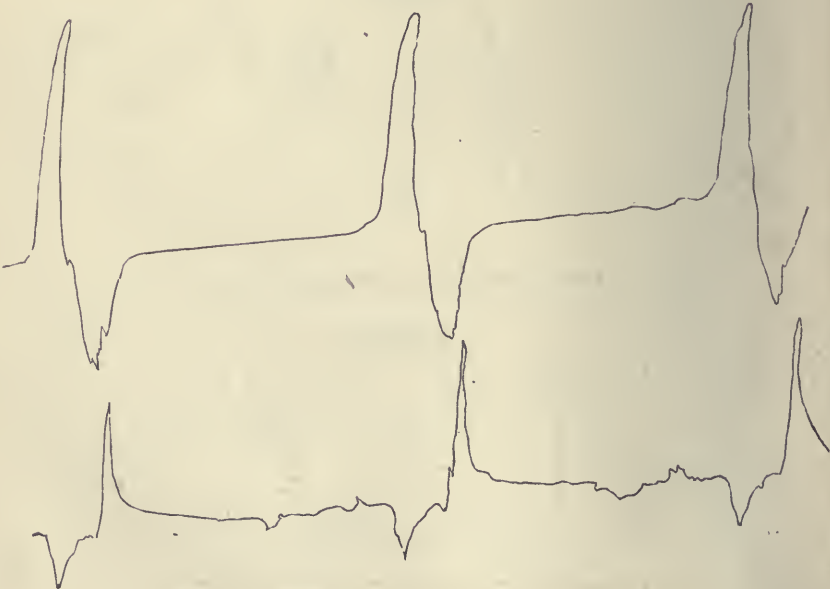
Tracing 8.



Tracing 9.

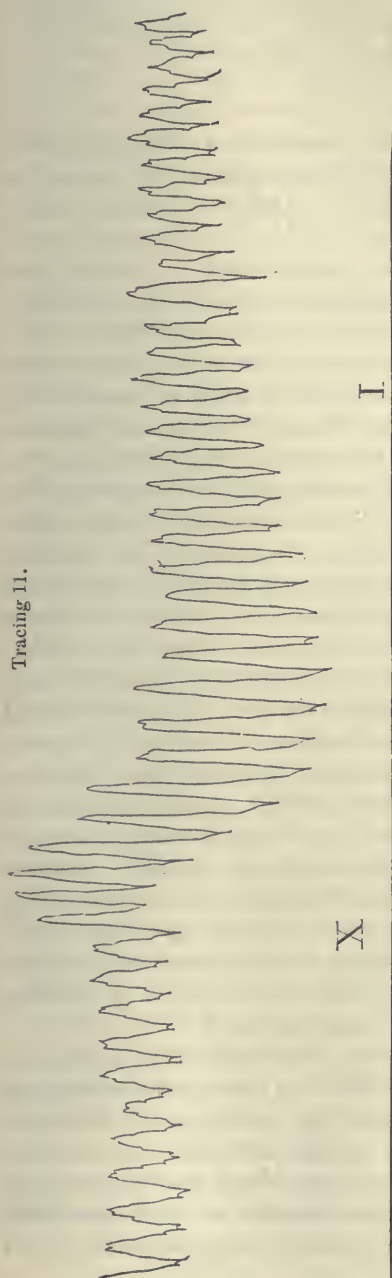


Tracing 10.

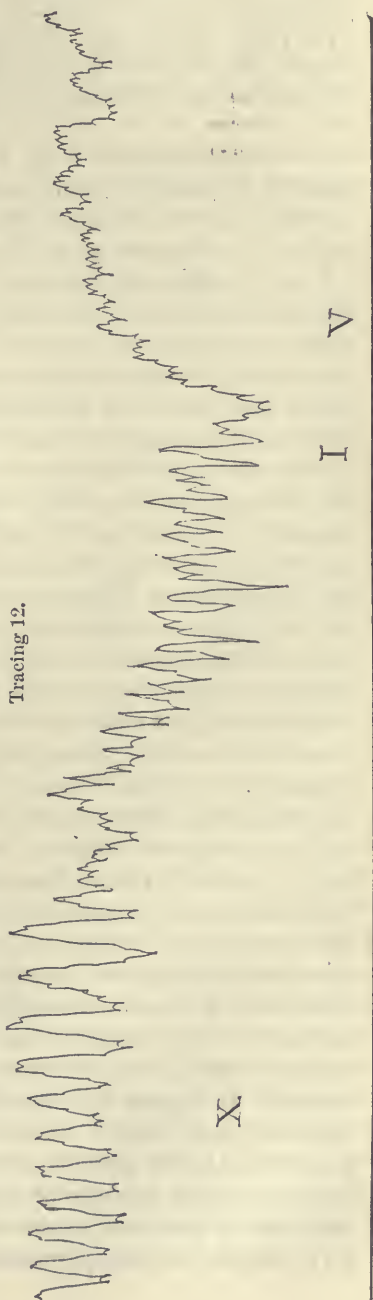


Explanation of Tracings 11 and 12.—The X indicates the time of electrical stimulation; the I indicates the cessation of stimulation; V indicates the occurrence of vomiting.

Tracing 11.



Tracing 12.



ART. XIII.

ERYSIPELAS AS A COMPLICATION OF PREGNANCY AND LABOR; WITH A REPORT OF A CASE OF HERNIOTOMY, PERFORMED ON A PATIENT SUFFERING FROM ERYSIPELAS. By G. H. BALLERAY, M.D., Surgeon to St. Joseph's Hospital, and the Ladies' Hospital, Paterson, N. J., and to the Woman's Hospital, Newark, N. J.

THE interesting paper of Dr. Wm. L. Wardwell, on "Erysipelas complicating Pregnancy," which appeared in the number of the AMERICAN JOURNAL OF THE MEDICAL SCIENCES for April, 1884, induced me to put the following cases on record:—

CASE I.—Was called in July, 1876, to attend Mrs. R., aged 26, who was daily expecting her confinement, and found her suffering from a very severe attack of facial erysipelas. I had attended her in her first labor, three years previously, and had not forgotten the anxiety which she caused me on that occasion in consequence of a severe attack of scarlet fever, which developed thirty-six hours after delivery. When I was called to see her this second time and found her suffering from erysipelas in a severe form, I felt that should delivery occur during the progress of the disease, as it undoubtedly would, the patient would, in all probability, die of blood-poisoning. On the second day of the disease, labor came on, and the patient was delivered of a healthy, living male child. I directed that the vagina be syringed out every six hours with hot water, followed by a weak carbolic solution; and that the treatment to which the patient had been subjected previous to delivery be continued. Stimulants and concentrated liquid nourishment were given freely. The disease pursued its usual course, and the puerperal convalescence seemed to be in no wise affected by it. On the fifth day of the disease (third day after delivery), the temperature, which at one time reached $104\frac{3}{5}^{\circ}$, began to decline, and the pulse became less frequent. On the seventh day, the temperature was $101\frac{2}{5}^{\circ}$; pulse 96. On the ninth day, the temperature was 99° ; pulse 84: from that time on, convalescence was uninterrupted. At no time, during the progress of the disease, was there pain or tenderness over the uterus; the lochial discharge was not suppressed, and was no more offensive than it frequently is after an uncomplicated labor. The secretion of milk was moderately abundant, and the patient nursed her child.

There seems to be a difference between the poisons of erysipelas and scarlatina as regards the influence which they exert on the secretion of milk and on the lochia. In the case of this patient, who had a severe attack of scarlatina after the birth of her first child, there was complete suppression of the secretion of milk and of the lochial discharge; and my experience of puerperal scarlatina, which amounts to seven cases, leads me to believe that these phenomena are constant accompaniments of that

disease when it occurs shortly after delivery; whereas, in the two cases of erysipelas complicating labor, which have come under my observation, the lacteal secretion and the lochial discharge were, apparently, unaffected.

CASE II.—In January, 1879, after an absence of a few days, I met, on my return, my friend, Dr. Marsh, who seemed to be particularly glad to see me. I soon learned that this emotional state was due to the fact that the doctor had under his care a patient of mine, who was hourly expecting to be confined, and who was suffering from a severe attack of facial erysipelas. The doctor, very properly, regarded the complication with dread; and I inferred from what he said, that it would afford him much pleasure to turn the case over to me, and that, if the patient must die, he would somewhat prefer that she should die on my hands. On visiting the patient, I found her with a pulse of 118; temperature $103\frac{2}{3}^{\circ}$. I informed the husband of the dangerous nature of the case, and directed that the treatment, advised by Dr. Marsh, be continued. The same night I was sent for, and found that the patient had had labor-pains for about three hours. I found the os dilated to the size of a dollar; head presenting, in the first position. My experience with the patient in her three previous labors led me to believe that she would soon be delivered. In about an hour, a healthy female child was born. The placenta, as in the previous case, was delivered by Credé's method; but, in both cases, I abstained from my usual custom of introducing a finger up to the os uteri (after the delivery of the after-birth), to ascertain if any shreds of membranes can be felt. A dose of ergot was given after the delivery of the placenta, and gentle manipulation of the uterus was continued until the organ was firmly contracted. In the after-treatment of the case, thorough ventilation of the room, perfect cleanliness, and the use of hot carbolized vaginal injections were the only measures insisted upon. On the tenth day after delivery I ceased my attendance; the patient being convalescent.

The management of labor in the case of a woman suffering from erysipelas does not materially differ, other things being equal, from the management of a case of normal labor. The accoucheur should abstain from frequent vaginal examinations during labor; and such examinations as are necessary should be made with *clean* hands. The placenta should, if possible, be delivered by Credé's method; thus avoiding the introduction of the finger or hand within the genital canal. A full dose of ergot should be given after the delivery of the placenta; and the uterus should be gently manipulated until it is *firmly* contracted. In the after-treatment, the nurse should be forbidden to touch the genitals of the patient, without having previously washed her hands thoroughly with *hot* water and soap. The use of antiseptic vaginal injections should be commenced within twelve hours after delivery, and continued so long as there is any indication for their employment. Some of our rigid antisepticists would probably recommend that the patient be delivered under a cloud of car-

bolic acid spray, and that immediately after delivery, Garrigues's antiseptic pin-cushion be tacked over the vulva. These extraordinary precautions were not adopted in the two cases above narrated, and their omission does not seem to have been productive of harm.

As regards erysipelas occurring during the early months of pregnancy, my experience is limited to two cases. One was a patient who was admitted into St. Joseph's Hospital, between the third and fourth months of pregnancy. She recovered from the attack of erysipelas, and was, I understand, safely delivered at full term. The other was a private patient, who was attacked with erysipelas when in the third month of pregnancy. She also went safely through the *fiery* ordeal, and was delivered of a healthy living child six months later. Erysipelas occurring in a pregnant or puerperal woman calls for no special medication; the treatment of the disease under these circumstances being the same as when it occurs independently of these conditions. There is one remedy, however, which is particularly serviceable in the class of cases under consideration: viz., opium. It should be given in doses sufficient to tranquillize and soothe the nervous system, and procure sleep at night.

Although foreign to the subject of puerperal erysipelas, the following case may not be devoid of interest in this connection:—

CASE III.—In May, 1880, I was asked by Dr. E. J. Marsh to see, in consultation with him, a Mr. M., 80 years of age, who was suffering from an attack of facial erysipelas, which had commenced the day before, and who was also the subject of a strangulated inguinal hernia. I saw the patient at 11 P. M. The hernia was tense, and painful to the touch, and the patient had vomited several times. I learned that the patient got out of bed without his truss in the early part of the day, and that the hernia at once came down, and shortly afterwards became troublesome. The old gentleman then attempted to reduce it himself, but without success. He then sent for Dr. Marsh, who tried to reduce it, but failed. In view of the lateness of the hour, I suggested to Dr. Marsh to give the patient a dose of morphia, and wait until early the following morning, then administer ether, and attempt the reduction of the hernia; and failing in this, to proceed to perform herniotomy.

Dr. Marsh did not receive my suggestion in reference to herniotomy with much enthusiasm. He evidently took a most melancholy view of the case. In fact he stated, as his opinion, that should it be necessary to resort to a cutting operation to effect the reduction of the hernia, the operation wound would almost certainly be attacked by erysipelas, and that death would be the result. Courtesy, however, if not conviction, caused him to yield assent to my proposition.

My experience with the puerperal cases above referred to made me more hopeful than Dr. Marsh, and besides there was another circumstance which to my mind argued in favor of the course which I advised, viz., it

was the only thing that could be done, except to let the patient die without making an attempt to save his life. On the following morning ether was administered, and Dr. Marsh made a faithful attempt to effect the reduction of the hernia, but did not succeed. He then requested Dr. Calvin Terriberry and myself to try, but we both declined, as we felt that any further manipulation would be detrimental; and, moreover, we both had perfect confidence in Dr. Marsh's skill, and believed that, if it were possible to reduce the hernia by taxis, he would have succeeded in doing so. Herniotomy being the only alternative, Dr. Marsh proceeded to operate. The doctor is a faithful disciple of Mr. Lister, and the details of the antiseptic system, including the use of the spray, were carried out to the letter. In order to divide the stricture it became necessary to open the sac. The intestine was deeply congested, but the color improved after division of the constriction; it was, therefore, returned to the abdominal cavity. Considering the age of the patient, convalescence from the operation was rapid. The wound healed kindly, the reparative process being apparently unaffected by the existence of the facial erysipelas.

I now frequently meet the patient on the street, and he looks as if he might live ten years longer.

This case is interesting, as demonstrating the fact that a patient suffering from severe erysipelas of the face may undergo a serious surgical operation without developing erysipelas in the operation wound. Not having had the leisure to look up the literature of the subject, I am unable to state whether or not any similar case has ever been reported. To what extent the employment of rigid antiseptic measures contributed to the good result, it is of course impossible to say; but, in view of the risks of such an operation under such unfavorable circumstances, the surgeon who would fail to protect his patient by all the safeguards known to science would be lacking in a proper sense of his own responsibility.

ARTICLE XIV.

PSORIASIS—VERRUCA—EPITHELIOMA; A SEQUENCE.¹

By JAMES C. WHITE, M.D., Professor of Dermatology in Harvard University.

It is my purpose in this paper to present brief notes of two remarkable cases of disease—cases extraordinary, not for the rarity of the pathological processes they represent, but for the very unusual sequence of tissue-change exhibited in their course.

¹ Read before the Boston Society for Medical Improvement, November 24, 1884.

CASE I.—In 1866, a gentleman, æt. 27, consulted me on account of psoriasis. It had first manifested itself six years previously, and had remained constantly present in some degree up to this date, nearly disappearing each summer, but increasing again in intensity in the winter, in spite of considerable doses of Fowler's and Donovan's solutions, which had been taken from time to time. The disease had not been known in the family in other generations, and the patient's health had otherwise been uniformly excellent. At this time the only portions of the integument affected were the forehead, chest, and arms. The type of the disease was *guttata* and *nummularis*, and the patches presented a marked degree of hyperæmic activity, to such a degree in fact that they were greatly excited by such stimulating applications as Vlemineckx's solution, and tincture of German soap and oil of cade, which were at that time employed; and in fact the skin then and subsequently showed itself unusually intolerant of active external remedies, to such a degree that Fowler's solution was again advised as the only hopeful or possible means of relief. The case remained under my occasional observation for ten or twelve years without marked features of interest, but during all this time it retained an extraordinary obstinacy to all methods of treatment, external or internal, which were employed, many of them the new remedies introduced into the materia medica of the disease in that period. The disease in the mean time manifested its own independent vagaries of advance and retrogression, now and then covering large areas of the general surface of the body, but never wholly disappearing from certain localities, as the scalp and backs of the hands.

Ten years ago several of the patches upon the latter parts and the lower forearms especially, began to undergo a change. Their bases became less hyperæmic, and they themselves more elevated and less scaly, until they were gradually converted into sharply-defined, prominent, firm, and horny outgrowths, some of them resembling the unpigmented formations of keratosis senilis in the same localities, while others were more like callosities or some form of warts.

Three years ago one of these outgrowths, situated upon the right palm near the wrist in one of the great longitudinal dividing furrows of the skin, became excoriated either by abrasion or fissuring, which refused to heal by the simple measures employed, and terminated in a small ulcer. It remained in this condition many months, sometimes nearly filling up and protecting itself with a thin epithelial cover, sometimes breaking down again and remaining in an open, indolent condition, but the destructive process gradually extended more deeply into the cutaneous tissues and widened its borders. After a time the peripheral portions of the integument became indurated and thickened, forming a dense and elevated circumvallation about the central ulceration. During this long period the efforts to restore the part to a healthy condition were persistent and various; at first simply soothing applications combined with restraint to the movements of the part, afterwards more stimulating applications, then cauterizing agents, as chromic and concentrated nitric acids, and later the curette. Finally, as the ulcer enlarged and deepened, so that the integument involved in the destructive process and surrounding induration was one-half inch in area, the whole growth in August, 1883, was deeply scraped. At the same time another lesion identical in history and character, but of much smaller size, which had more recently and gradually established itself upon one of the warty hypertrophies situated upon the

palmar fold of skin between the fore and middle fingers of the left hand, was also thoroughly curetted.

These more radical operations were, however, as unsuccessful as the measures previously employed. The wound closed up, and some sort of epidermal covering was established, but the areas primarily affected became the seat of a much more rapidly progressive induration and thickening, so that the integument of the right palm became involved in the process to the extent of more than an inch in circumference, and presented subsequently, at the beginning of this year, at a consultation held by Prof. Henry J. Bigelow, and Dr. R. M. Hodges, under whose skilful and constant surgical care the case had been for a long time, with the writer, a reddened prominence, largely occupying the lower third of the palm, of somewhat uneven surface, in the centre of which a new ulcer had established itself with an everted edge of exuberant fungoid granulations. To the touch the rest of the mass was deeply resisting, except in one or two parts, where boggy-feeling globular elevations the size of a large pea, and somewhat translucent, existed. These had also formed in the neighborhood of the ulcer before the last operation. Upon the other hand, too, the tissues surrounding the seat of the curetted ulcer were becoming rapidly indurated to a much greater extent than previously. The brachial and axillary glands remained unaffected. The parts had been excessively painful for a long time, and the patient's strength was giving way under his suffering and anxiety. His medical attendants had long previously formed an opinion that the disease had become epitheliomatous in character, and were then of the unanimous conclusion that it could be overcome only by thorough removal of the affected tissues. The growth had penetrated so deeply that a radical local excision of the diseased parts alone was no longer possible, so that amputation of the right hand and of as much of the left as was involved in the diseased process was advised. Before resorting to such extreme measures, however, it was thought advisable by them, considering the rare, or even unparalleled, history of the case, that the patient should have the benefit of the opinion also of certain distinguished dermatologists and surgeons in Europe, and accordingly he proceeded thither in January of this year and consulted Mr. Hutchinson and Sir James Paget, of London, and Professors Kaposi and Billroth, in Vienna.

On his return, after an absence of six or seven weeks, during which he had the personal attention of Dr. G. W. West, the disease was found to have made great advance. The skin of the whole palm of the right hand had apparently become implicated in the process, and the lower half was fully occupied by a deep ulcer with dense, enormously everted edges in a state of flamboyant granulation, encroaching at its inferior part upon the wrist. The ulcer upon the left hand had also extended rapidly, and was assuming the same fungous, exuberant appearance as the other. The patient's general condition had naturally become decidedly worse, for the prognosis had not been lightened by the opinions he had obtained from the eminent professional gentlemen above named, and the affected parts were excessively painful, so that sleep was obtained only by the aid of narcotics. As it was decided by his medical attendants after repeated consultations that nothing was to be gained by further delay he consented to submit to the measures previously advised, and in April last the right hand was amputated above the wrist, and the fore and middle fingers of the left hand were excised through the middle of the metacarpal bones by

Dr. Hodges. The wounds healed quickly and properly, and the long-continued sources of mental and physical irritation having been thus wholly removed, the patient regained his old condition of good health, and the tissues bordering upon the former seats of disease have remained in their normal state.

The parts removed were given to Prof. Fitz for examination, who makes the following report: "The palm of the right hand presented an elevated, rounded, ulcerating mass with dense everted edges and irregularly scalloped outline. The surface for the most part was smooth, reddish-gray, and translucent, but showed an irregular deep, sinuous depression at the upper and outer fourth. It measures two and a quarter by three and a third inches, and the mass projected two-thirds of an inch above the cutaneous surface.

"On section the superficial ulcer corresponded with a circumscribed new formation, one and a quarter inches in thickness, extending through the skin and subcutaneous fat tissues to the deep fascia, being intimately united to the tendinous sheaths, which were not perforated. The growth was continued into the substance of the unciform bone and into the abductor minimis digiti. The cut section was in general relatively homogeneous, gray, and translucent. Minute ecchymoses were present near its free edge, and occasional opaque lines extended upwards and outwards from the base. Pressure caused the escape of small, soft, opaque, white plugs.

"The microscopic examination showed that the structure was composed of variously shaped, anastomosing bands of cells, resembling the deeper layers of the epidermis, and separated by a framework of fibrous tissue. The bands contained numerous onion-shaped bodies of laminated epidermoid cells, and extended irregularly in all directions.

"At the palmar base of the fore and middle finger of the left hand was a small, superficial ulcer upon the surface of a dense rounded and flattened nodule, one by one and a half inches in length and breadth, and three-fourths of an inch in depth. The cut section of the nodule showed a gray, slightly translucent new formation traversed by occasional fibres. The growth extended into the subcutaneous fat tissue, and the tendons beneath were freely movable. The structure was like that of the growth on the right hand, though the fibrous portion was relatively more abundant, and in both the characteristic appearances of flat cell, epidermoid cancer were presented."

This case presents, therefore, three distinct pathological affections of the cutaneous tissues; psoriasis, verrucous hypertrophy, and epitheliomatous new growth; not occurring independently of each other, but as successive, mutual transformations in the above order. It is this sequence which constitutes its peculiar features. I cannot find its like recorded in dermatological literature. Psoriasis has in very rare instances developed into warty growths in certain localities; verrucæ, as is well known, not unfrequently degenerate into epithelioma; but no case is on record, so far as my knowledge extends, of psoriasis terminating in cutaneous carcinoma through this or other intermediate transformation. Psoriasis is among the more common affections of the skin, 1924 cases having been recorded in the 58,617 cases of cutaneous disease reported by members of the

American Dermatological Association in its combined returns of five years, a ratio equal to 3.28 per cent. It is, therefore, a matter of frequent observation, and no disease of the integument presents a more regular course, a greater uniformity and simplicity of lesions, and a more indifferent relation to the economy as a whole than it. It might have been predicted in every individual case before this, as far as the recorded experience of dermatologists reaches, that the disease could lead to no serious results directly or indirectly.

Let us consider what is the nature of this affection, and what connection there may be between it and the other two processes with which it is so intimately associated in this case. Psoriasis has been generally regarded as an inflammatory process of the skin, and in most works on dermatology it is placed among the inflammatory or exudative affections. Hebra, however, in his latest edition, laid greater stress upon its relation to simple epidermal hyperplasy, and his son, in his recent work—*Die krankhaften Veränderungen der Haut*—describes it as a local epithelial hyperplasy produced by the quantitative increase and qualitative (alienation) change in all the epidermal strata. Dr. A. R. Robinson, of New York, was among the first to recognize the essential anatomical nature of the disease, and to show by thorough microscopical study that it is not primarily an inflammatory affection of the papillary layer of the corium. In the beginning the process is simply one of hyperplasy of the Malpighian layer, and the apparent hypertrophy of the papillæ is the result of the extension downwards of the newly-formed rete cells, the intermediate papillæ not being elevated above the general level of their tips in the surrounding healthy skin. Later the bloodvessels of the papillæ become dilated, serum and white corpuscles exude, and these conditions with the great increase of epidermal development give rise to the redness and thickening of the skin. The important points established by Dr. Robinson's investigations are that the hyperplasy precedes the hyperæmia, so that any inflammatory phenomena in the tissues of the cutis are to be regarded as secondary and not essential features of the disease.¹ Of the reality and intensity of the inflammation of the cutaneous tissues which not unfrequently accompanies the disease there can be no question. This is of most common occurrence in the early stages of universal psoriasis of rapid evolution, but occasionally accompanies individual cases throughout their course. The dermatitis at times amounts to a true eczema, and often demands special treatment for its relief before the proper and more stimulating applications for the psoriasis can be employed.

Auspitz, in his *System der Hautkrankheiten* (Wien, 1881), has contributed a valuable chapter to our knowledge on the classification of affections of the epidermis, among which he places psoriasis. This seventh

¹ New York Medical Journal, July, 1878.

class of his system contains the following subdivisions, which in their mutual relations are of especial interest in connection with the cases under our consideration, as shown in the accompanying table:—

7th Class.—Epidermidoses = Anomalies in the growth of the cuticle.

A. Keratonoses = Anomalies of formation of the horny layer.

Family II. Parakeratoses = Quantitative anomalies in the process of cornification.

Psoriasis.

C. Akanthoses = Anomalies of the prickle layer of the epidermis.

Family I. Hyperkanthoses = Simple akanthoma.

Verruca = Warty akanthoma.

Family II. Parakanthoses = Alveolar akanthoma.

Epithelioma. (With cornification of the cells of the new growth.)

He recognizes the following anatomical changes as of constant occurrence in *psoriasis*; an increased thickness of the horny layer; certain changes in the stratum granulosum and stratum spinosum indicating more rapid transformation in their development than is natural, as shown by an increase of the nuclei in the deeper layers of the prickle cells and a more abundant granulation in the uppermost, in those undergoing transformation into the true granular cells, together with a more rapid loss of their spines, and a thicker superposition and change in form of the cells of the cylindrical layer; and, finally, an overfilling of the papillary capillaries. He regards the disease, therefore, not as an inflammatory affection, but as an anomaly of the process of cornification of the epidermis, and imperfect transformation, that is, of its cells, so that those of the horny layer do not adhere closely, and form dry and scaly elevations, while the younger, deeper layers are also less adherent, so that the cylindrical layer is easily laid bare above the hyperæmic tips of the papillæ, which bleed readily on such denudation.

In *verruca* we have a quantitative change in the formation of the stratum spinosum, an excessive formation of the prickle cells, extending in some forms far downwards into the corium between the papillæ, thus simulating a marked prolongation or hypertrophy of these bodies. The down-growth of the epidermal cells is always continuous, however, and nipple-shaped in its encroachments upon the cutis. The cornified cells of the upper layers are magnified in quantity in the same proportion.

Whenever this uniformity or continuity of epithelial hypertrophy or new growth is interrupted in its invasion of the tissues of the corium, and the epidermal cells are found seemingly developed in separate foci below the general line of the rete, we have another condition to which we apply the title *epithelioma* or carcinoma. In it the prickle cells are arranged in no orderly manner, but permeate the tissues of the corium in all directions it may be, or congregate in nests or alveoli, taking their origin either from the cells of the epidermis or from their continuations along the glandular structures of the cutis.

We see, therefore, that these three dermatoses which enter into the clinical history of our case, and which are in their nature apparently as unlike as their companionship is rare, have a close affiliation in their anatomical relations. The transformation of patches of psoriasis into horny or warty permanent growths is not referred to in most works on dermatology as of possible occurrence even; the transformation of verrucous growths into epithelioma is of not very infrequent occurrence; but the sequence followed in our case, psoriasis—verruca—epithelioma, is extremely rare or unparalleled in dermatological history. Milton says¹ “there is a form of wart so like lepra,² or of lepra so like wart, that I am at a loss to know which it is,” and in one of the three cases observed by him the growth “began as lepra-spots;” and Gaskoin³ states that “psoriasis often displays a condition which shows a near approach to warts.”

With the difficulty of distinguishing palmar psoriasis at times from syphiloderma of this part, the resemblance of these secondary callosities to the latter, or the syphilide cornée of French writers, is worthy of special mention in connection with our case. To one who had not observed the disease from its early manifestations and watched the local changes above referred to step by step, the appearances of the hands alone, while the disease was in a quiescent state as far as the general surface was concerned, might have suggested the question of their syphilitic character. They were, however, well marked horny concretions, rising above the general surface in the form of prominent, more or less conical elevations. They had not that appearance of being embedded or encapsuled in the skin, as if they could be easily enucleated, nor were they seated upon a hyperæmic base or surrounded by a scaling ring or wall-like edge. They were in reality, what close observation and their history demonstrated, horny concretions, true warty growths springing up from the seats of old patches of psoriasis. In other words, a long-continued process of modified epidermal formation had upon parts spontaneously prone to such development transformed itself into a permanent hypertrophy of the same cell tissue.

The subsequent change is of far less uncommon occurrence, that namely of so-called benignant epidermal growths into those entitled malignant. Epithelioma may follow simple prolonged inflammation of the cutaneous tissues, as in the so-called Paget's disease of the nipple, or protracted granulation formation, as in the exuberant outgrowths of elephantiasis, chronic ulcers of various origin, in lupus, old fissures of the lip and elsewhere, etc.; but even in these cases, where the primary disease is seated in the deeper layers of the skin, the epidermal tissues become

¹ Pathology and Treatment of Diseases of the Skin, London, 1872, p. 329.

² The word lepra is here used in the British sense, synonymous with psoriasis.

³ On the Psoriasis or Lepra, London, 1875, p. 87.

involved in the perverted development only after prolonged efforts to reproduce themselves in proper place and form. It is, however, in the course of affections of the epithelial structures of the skin that this malignant transformation is most frequently observed. The most common starting point of epithelioma of the face in all its clinical varieties from the flat, superficial forms to the "rodent ulcer," or stages of deep penetration, is that very frequent condition of imperfect epidermal formation after middle life called *keratosis senilis*. The cutaneous horn, the sebaceous cyst, both modifications of the epithelial structures, may eventually, as is well known, undergo transformation into this disease, and, to approach more closely to the anatomical conditions in this case, the pointed condyloma and the ordinary verruca, essentially identical in structure and primarily an epidermidosis rather than a papilloma, may also terminate in it. Epithelioma of the skin may be said not only to follow all these affections above described, but to rarely occur without some similar precedent process.

In this instance two factors may have been operative in the development of the final condition, not only the verrucous hypertrophy with the possibilities of epitheliomatous transformation essentially incident to it, but the prolonged ulceration and granulation of the cutaneous tissues, which may at first have been simply the expression of futile reparative efforts in a part of less vitality than the surrounding structures and terminating in a perversion of cell development. Whether one or both of these agencies were active and just when the epitheliomatous transformation was established in this case, cannot be definitely determined. Eventually there were observed, in addition to the slowly progressive infiltration and destruction of the surrounding tissues, the development of encysted centres of secondary metamorphosis (colloid) beyond the visible bounds of the disease, and finally a most rapid outburst of exuberant fungoid outgrowth.

Thus we have established an uninterrupted sequence of psoriasis through verruca into epithelioma, or, in other words, psoriasis as a cause of carcinoma. Of so serious a termination of so common an affection I could find no record, and believed that the case would remain in my experience, as long in the future as in the past, unique.

CASE II.—On the first of August of this year a gentleman, fifty-two years old, consulted me on account of a sore upon his hand of several years' duration. He showed me an ulcer occupying the anterior surface of the right wrist, extending slightly into the palm of the hand, about two inches in length and one and a half inches in transverse diameter. It was surrounded by a very prominent and indurated border, extending deeply beneath the skin, and was very painful. I noticed at the same time upon his forehead several small, slightly elevated patches, red and covered with thin scales, and upon the hands and fingers a considerable number of horny, wart-like growths. I immediately recognized that I

had before me one of those extraordinary coincidences of the simultaneous occurrence of disease of extreme rarity. Here was again a patient who presented general psoriasis, warty growths upon the hands, and unmistakable epitheliomatous disease. What was their connection in this case? I found that he had had psoriasis nearly constantly since early manhood, and had tried various methods of cure, including arsenic, mostly in vain as far even as temporary results. Some ten years ago several of the chronic patches of psoriasis upon his hands began to assume a thickened, horny appearance, and transformed themselves into true warty outgrowths. Some time since one of these upon the palmar surface of the wrist softened and became a sore, which could not be made to heal, and gradually developed into its present condition in spite of repeated efforts to cure it by caustics and scraping.

Such was the history in brief of the ulcer. In addition, one of the warty formations between the fingers was beginning to soften, and revealed on pressure a boggy consistence. There were also a small, prominent, ulcerating patch upon the inside of the buttock near the anus, and two small excoriations covered with crusts of doubtful character upon the penis and in the groin, none of which were of long duration. The general surface presented a sparsely scattered psoriasis of *guttata* variety. The patient was somewhat feeble from the suffering caused by the disease in the palm. There was no affection of the brachial glands. He was advised to have the diseased tissue removed by thorough excision, and for this purpose he entered the Massachusetts General Hospital, under the care of Dr. R. M. Hodges, who had seen the patient with me, and recognized the remarkable identity of the case with that first reported. Dr. Hodges has kindly prepared the following account of its subsequent history: "The operation performed on Mr. —'s wrist, August 18th, was an excision of the diseased tissues, without regard to the extent of surface sacrificed, or the depth or character of the parts involved. This extent represented superficially the area of a circle two and one-eighth inches in diameter, and in depth penetrated to the flexor tendons and the anterior surface of the carpal bones. The ulnar artery and nerve, the palmaris longus tendon, portions of the muscles of the thumb and of the little finger, and the anterior annular ligament were divided or removed. The patch near the anus was also dissected out. September 12, a necrosis of the tendons and fasciæ along the ulnar side of the forearm, which had slowly taken place, required an incision and the removal of the dead tissues. The healing processes following these two operations having been nearly completed, the patient, without apparent reason, on September 18th, suffered sudden and extreme pain at the inner side of the upper arm. On the 20th the red lines of a lymphatic inflammation were visible, the axilla gradually became swollen and infiltrated without any focal centre, and a deep cellulitis with grave constitutional symptoms developed itself. In spite of free incisions and active supporting treatment, the patient's strength gave way, and on October 4th death occurred from exhaustion. It is needless to say that from first to last, the most painstaking antiseptic dressings were used." This unfortunate termination had, of course, only an incidental connection with the operation, which promised to be as successful as that in the first case.

An examination of the tissues removed by excision was made by Prof. Fitz, who furnished the following report: "The specimen was characterized by the presence of large masses of epithelioid cells of irregular shape

and size, separated by narrow bands of fibrous tissue, and extending deeply downwards into the subcutaneous fat tissue. The appearance and grouping of the epithelioid cells suggested that all the epithelial constituents of the skin were involved, rete and epidermis, hair and sebaceous follicles, likewise the sweat glands. An atypical new formation, simulating the last-mentioned structures, with a central cavity, was abundantly present in the main tumor. The smaller nodule (from anal region) of more superficial growth simulated in its new formation rather the other cutaneous structures.

"A comparison of the specimens from the two cases showed a marked difference of composition. That from Case I. presented an abundant, dense, fibrous stroma, with narrow and sparse anastomosing bands of small, round epithelioid cells. The shape, size, and junction of these bands directly suggested the distribution of the lymph-vessels of the skin. Indeed, the question directly arose, whether the new growth may not have affected primarily the lymphatics, representing what has been called catarrhal lymphangitis. The specimen from Case II. showed an abundant, luxuriant growth of large epithelioid cells with but a scanty fibrous stroma between the masses. Epidermoid pearls were numerous in the small nodule, and cavities of considerable size with irregularly projecting and abundantly cellular walls suggested the dilatation, as well as new formation, of an adenoid structure resembling the sweat-gland."

[During the preparation of this paper for the Society, I discovered in *Ziemssen's Handbuch*, Band xiv. (Hautkrankheiten), a reference to a case, the following brief account of which is published in the *Gaz. des Hôpît.*, 1878, p. 750. Dr. Cartaz presented to the Anatomical Society the report of a healthy man, 40 years old, who had never had any other disease excepting a psoriasis, which began twenty-three years previously, and had invaded among other regions the palms and soles. In consequence of scratching, the scales upon one of these processes, situated upon the palmar surface of the second phalanx of the ring finger of the right hand, was removed, and there remained a little ulceration, which gradually extended to the size of four centimètres. The callous borders and the deep-seated granulations, bleeding at the slightest touch, established the diagnosis of *cancroïde*. Amputation at the metacarpo-phalangeal joint was performed, and there was no return of the disease.

Although no mention is made in this very brief report of the intermediate formation of warty growths, there can be no doubt at least of the close resemblance of the case to those above reported in the connection of its initial and final processes, probably none of its complete identity.]

We have thus the record of three cases of psoriasis terminating in carcinoma of the cutaneous tissues. There are no peculiarities in the history or character of the primary dermatosis in the first two, at least, to suggest even an explanation of so rare and grave a transformation of process. Innumerable cases of as long duration and intractable type occur with no such termination, and it is unlikely that psoriasis is capable

of such a direct change. The lesson to be drawn from their study is, that the transformation of patches of psoriasis into verrucous hypertrophy must be regarded as an ominous occurrence, and that the softening or other change of such horny growths demand thorough excision without delay.

ARTICLE XV.

A CASE OF UNILATERAL SPASM OF THE TONGUE. By EDMUND C.
WENDT, M.D., of New York.

SPASM of the tongue, occurring as an independent affection, is generally recognized to be quite rare. A case of this kind having recently fallen under my notice, I thought it deserved to be placed on record.

Mr. U., aged 36, single, a native of the United States, first consulted me for his present trouble in December, 1883. He was a medium-sized, powerfully built man, of excellent physique, and fair mental capacity. His occupation of builder or contractor gave him ample but not excessive out-door exercise. He was entirely free from any hereditary or acquired taint. His past life had been one of moderation in all respects. He was neither a drinker nor a smoker in the usual sense, although he was not a total abstainer. As regards sexual intercourse, while not claiming to be absolutely continent, he had never felt much desire for indulgence of that kind. He remembered no serious illness at any period of his life, and save for the trouble with his tongue and throat, considered himself, even now, in perfect health.

Regarding the ailment for which he sought advice, he stated that, for some weeks past, the right side of his tongue would now and then suddenly get hard and be thrown into contractions. Such attacks would last for from one-half to several minutes. The intervals were quite free from morbid manifestations of any kind, except a feeling of rawness or soreness at and about the right tonsil. He further said that the lingual spasm would sometimes completely disappear for one or two days, and at other times recur every few hours. He paid little attention to it at first, but latterly it seemed to be gaining in intensity to such an extent that it interfered somewhat with distinct articulation. An examination of his throat and tongue revealed nothing abnormal, nor did the rest of his body show any noteworthy departure from health. It should here be stated, however, that at a subsequent examination by a specialist, there was found "deviation of cartilaginous nasal septum to the right, hypertrophy of both inferior turbinated tissues anteriorly," and some "chronic irritative hyperæmia of the larynx." I use the exact words of the written

report submitted to me by the specialist to whom the patient was referred. The special senses in the case of Mr. U. were normally acute; and with particular reference to his tongue, taste was perfect on either side, as appeared from repeated experimental trials in that direction.

I was unwilling at first to place entire credence in the history as furnished by the patient. For several weeks he took arsenic and bromides, and used a variety of gargles and mouthwashes. He derived no benefit from this treatment, the paroxysms came as before, and if not occurring with increased violence, they were certainly not diminished either in severity or as regards the frequency of their occurrence. One day the patient was again in my office, when he suddenly stopped short in his speech, and opening his mouth pointed to the tongue. I then saw very distinctly that organ drawn a little to the right side, and a succession of rapid twitchings that lasted but a few moments, and presently culminated in a well-marked rigidity of the right half of the tongue. The entire phenomenon lasted about one minute, and the patient assured me that it had been a paroxysm of moderate severity. Being now convinced that I had to deal with a real motor disturbance, affecting some of the muscles supplied by the right hypoglossal nerve, I determined to try the galvanic current, especially as I now felt quite sure that the patient had spoken the truth with regard to his ailment. Daily applications were made in the following manner: A medium-sized sponge-electrode was pressed rather firmly against the angle of the jaw, and a ball electrode, connected with the cathode, was passed along the right margin of the tongue. The patient complained somewhat of an intensely metallic taste and a prickling sensation, but experienced no other unpleasantness. The strength of the current never exceeded ten cups of the gravity battery.

No improvement occurred until the eighth séance. Then Mr. U. stated that he had noticed a decided change for the better. This amelioration continued, and after fourteen sittings the spasms had completely left him.

It may be premature to report the case as permanently cured, since only ten months have passed since the disappearance of the spasm. Nevertheless the account just given may be considered as fairly illustrative of the decidedly beneficial action of galvanism in localized muscular cramps. Finally, I may say that the causation of this condition in Mr. U.'s case has remained dark to me. I have no theory to offer concerning it.

NEW YORK, 102 E. 57TH STREET,
October 22, 1884.

REVIEWS.

ART. XVI.—*Recent Works on Practice.*

1. *Lectures on the Principles and Practice of Medicine, delivered in Chicago Medical College.* By NATHAN SMITH DAVIS, A.M., M.D., LL.D., Dean of the Faculty, and Professor of Principles and Practice of Medicine. 8vo. pp. 896. Chicago: Jansen, McClurg & Co., 1884.
2. *A Text-book of Practical Medicine, designed for the use of Students and Practitioners of Medicine.* By ALFRED L. LOOMIS, M.D., LL.D., Professor of Pathology and Practical Medicine in the Medical Department of the University of the City of New York. 8vo. pp. 1102. 211 Illustrations. New York: Wm. Wood & Co., 1884.
3. *A Treatise on the Theory and Practice of Medicine.* By JOHN SYER BRISTOWE, M.D., LL.D., F.R.S., Fellow of the Royal College of Physicians; Senior Physician and Lecturer on Medicine at St. Thomas's Hospital, London. 8vo. pp. 1240. Fifth edition. London: Smith, Elder & Co., 1884.

IN a review, written in 1881, we remarked upon the paucity of American text-books of medicine, and upon the modesty of the sixty-five professors of "Theory and Practice," who for nearly twenty years had left the field in possession of foreign authors, with whom Wood and Flint alone competed. The example set by Dr. Bartholow, in 1881, was soon followed by Dr. Palmer, of Michigan; and now we have placed at the head of the list two new candidates for professional favor, which we propose to introduce to our readers.

1. One of the motives, and we may suppose the chief one, which has induced Dr. Davis, towards the close of his professional life, to give to the world this bulky volume, "was," as he says, "a desire to place on record those views and modes of practice developed in my own mind as a result of fifty years' constant devotion to the study and practice of the healing art." Another motive, which he mentions, will be less appreciated, viz., "to place within reach of medical students a work on practice which embodies in its text the metric system of weights and measures." Fortunately, to prevent embarrassment, the equivalents in the old system are given.

The work consists of ninety-two lectures, embracing substantially the course which Dr. Davis has been in the habit of giving in the Chicago Medical College, and prepared for publication, from stenographic reports, but in part rewritten, and all fully revised.

The first five lectures, upon the general principles of medicine, illustrate the difficulty a teacher has in escaping from the bonds in which a routine course, delivered year after year, tends to inclose him. They bear the impress of the thoughts and professional opinions of thirty years ago—at which time, very possibly, the framework was put together—

and though modernized in many respects, one is constantly reminded, in their perusal of those fine old works on Principles by Billings, Williams, and Simon. In Lecture VI., under classification, we are given a truly extraordinary arrangement of diseases. The two great divisions are made into General and Local affections, and the latter are divided into four sub-classes, Inflammation, Fluxes, Neuroses, and Miscellaneous. The term "fluxes" is stated to be not free from criticism; but it is made to do good service, and under it we find the motley group of diaphoresis (cutaneous flux), serous diarrhœa, epidemic and sporadic cholera, dropsies, and hemorrhages. The miscellaneous sub-class is an *olla podrida* of spasmodic asthma, aphonia, diabetes, angina pectoris, parasites, etc. And yet Dr. Davis naïvely enough remarks, in objecting to etiological or anatomical methods of classification, that they "lead to the grouping together of diseases the most dissimilar in their nature!"

To understand Dr. Davis's views on fever we must observe that he recognizes two inherent elementary properties of living matter, one which gives it the capacity to receive impressions, *susceptibility*, the other, *vital affinity*, causes the atomic changes, which result from the impression, to follow certain laws. Fever is not caused primarily by alteration of the blood or a depression of the nervous or other processes, but "consists in the action of some cause capable of disturbing the general elementary properties common to all the organized structures," *i. e.*, the susceptibility and vital affinity. Thus in the fever of pure excitement, febricula, both of these primary endowments of the living tissues are increased, whereas, in the typhoid group they are diminished; on the other hand, in the periodical group, sensibility is increased, and vital affinity impaired; and again, in the eruptive group of fevers, the sensibility is increased, and the vital affinity perverted.

The subject of typhoid fever is very fully discussed, and the author is strongly in favor of the view that it may arise spontaneously, holding that it may originate, first, in any dwellings in which, from over-crowding or ill-ventilation, the air, furniture, and walls of the rooms become impregnated with organic emanations; second, from the percolation through the soil, from drains or privies, of fecal and urinary matters; and, third, it may even occur in an individual without communication with other cases or sources of infection, originating from causes "such as protracted mental depression and anxiety, excessive mental and physical work, and abrupt changes from out-door to passive in-door work." Under such circumstances it is possible that there may be modifications in the processes of disintegration of living structures, evolving septic or other poisonous material, which, returned into the blood, produce febrile disturbance of the same character as when an organic poison is received from without. That the evidence for a specific typhoid germ has no existence except in the human imagination is the burden of the lecture on etiology, and a great many interesting facts are adduced against the more popular and prevalent theory.

Dr. Davis has been very successful in his treatment of the disease. Of 520 cases treated by him in the Mercy Hospital, from 1850 to 1880, only 1 in 16, or 6.2 per cent. died—a very low mortality for a general hospital. He attaches less importance to the temperature than other writers, and believes that the conditions of the kidneys, abdominal viscera, and lungs offer more reliable guides in prognosis. In his remarks upon treatment there is much of interest. In cachectic and depressed conditions of the

system he has found more benefit from the use of small doses of the bichloride of mercury with cinchona than from all the preparations of iron, cod-liver oil, and alcoholic stimulants. In typhoid its use is limited to the early stage.

The use of calomel for its specific curative effect in typhoid, revived of late in Germany, he has seen in many cases, and it was thoroughly tried and found wanting by the physicians of the South and West from 1835 to 1850. Dr. Davis is an unsparing opponent of the use of alcohol in the disease, believing that it increases the impairment of nerve force, lessens the interchange of carbonic acid gas and oxygen, and thereby favors the congestion in the lungs and other organs, and the fatty degeneration of the heart. Several very interesting cases are given illustrating his change of opinion on these questions. In the prostration and low delirium he relies upon careful feeding and the use of strychnia and nitric acid.

The lecture on yellow fever gives a full and clear statement of our knowledge of this affection, and the labors of the Southern profession are acknowledged and utilized.

In speaking of the history of epidemics of erysipelas in the country Dr. Davis is able to confirm, from personal observation, the truth of the statement, that the epidemic of 1841-46 was true erysipelas, and not "an acute infectious disease closely allied to diphtheria," as supposed by Hirsch and Zuelzer.

The important subject of the periodical fevers is discussed in three lectures. In the severe, congestive types the author strongly urges the use of the cold douche for the purpose of establishing a reaction. The author does not think that there is a distinct typho-malarial fever, but simply an intermingling of the symptoms and pathological changes in patients dwelling in localities in which the causes of both continued and intermittent fevers are prevalent.

Under local affections, inflammation is first considered, and here the author's two elementary properties of the tissues do good service in the analysis of the phenomena. In the three forms—sthenic, asthenic, and specific—the susceptibility of structure is exalted, and the quantity of blood increased. In sthenic the vital affinity is increased, and the quality of the blood plastic; in the asthenic form it is just the reverse, while in the specific the vital affinity is perverted, and the quality of the blood toxæmic. The process is thus explained in a simple manner, but by making very free use of properties, upon the nature of which, we are told, it would be a waste of time to speculate. We are given a lamp with which everything shall be made clear and bright, but with neither oil nor wick nor match.

We turned with interest to the lectures on pneumonia to find things new and old, which Dr. Davis has brought out of his treasures of knowledge. He shows pretty clearly that the disease prevails more extensively in the Middle and Northern States than in the Southern, as held by Drake and some recent writers. The disease is regarded as an acute local inflammation, not a general febrile disease, and there is no evidence of a specific poison, organic or inorganic. Typhoidal and malarial influences as modifying the type are considered. A form of rheumatic pneumonia is also described, but on very insufficient grounds. In the case which is quoted in illustration, the man had during the attack severe and persistent pain in the chest, endocarditis developed, and he died in about two weeks. The presence of these symptoms, and the fact that the patient had had

occasional attacks of articular rheumatism, led to the opinion that he had "subacute rheumatic inflammation of the parenchyma of the lung; in other words, genuine rheumatic pneumonia." Gouty and syphilitic forms of the disease might readily be described on equally good grounds.

The author's experience in the treatment is instructive. When he began practice in a country district in 1837 he bled and gave tartar emetic, and found that the sthenic cases did well on this plan. In his early days in Chicago, when malaria was prevalent, quinine was most useful, and bleeding, except in rare cases, of no utility. In the heart failure, which he does not look upon as induced so much by the fever as by the defective oxygenation, he finds the stimulating effects of quinine, digitalis, and chlorate of potash, with coffee, the most valuable remedies which have succeeded in his hands when alcohol has failed.

Three forms of phthisis are recognized: tuberculous, pneumonic, and fibroid. The question of the contagiousness is not discussed, and the bacillus is believed to be only an accompaniment of the degenerative changes in the tubercular masses and without causative influence. Even its diagnostic value is doubted.

The lectures on the nervous system suffer from the system of classification which the author has adopted. Meningitis, cerebral and spinal sclerosis, come, early in the work, under local inflammations; while apoplexy, hemiplegia, paraplegia, chorea, etc. come late in the sub-class neuroses. The large amount of good work which has been done of late in this department, and which has rendered the study of nervous diseases so much more simple, has not been utilized to a sufficient extent.

Lectures 82 and 83 on insanity, while pleasant reading, are too discursive, and do not show an acquaintance with modern psychological medicine. They should be dropped from a subsequent edition, and the pages allotted to a specialist. It is difficult to understand the omission of the subject of general paresis, so important to the ordinary practitioner.

Dr. Davis's therapeutics are most consoling in these days of general scepticism. Art with him is everything; Nature as understood by Holmes and others "not merely a fanciful goddess, but a positive hindrance to the advancement of practical medicine." We have already given some illustration, but will briefly refer to one or two others. Mercury holds a high place in his estimation, if one may judge from the number of times its use is advised in various diseases. The index contains eighty-three references to its employment. In hard cancer some very remarkable statements are made of the power of the bichloride to arrest the growth when combined with a simple milk and vegetable diet. Except in cases of cancer of the stomach he has never seen this treatment fail to relieve the pain and check the growth. On the question of the use of alcohol Dr. Davis is clear and emphatic, and if his opinions prevail with the staff of the Mercy Hospital, the item of "wine and spirits" in the annual account must be very small. He holds that from first to last it acts as a *paralyzant* and anæsthetic, and is in no sense a stimulant. As a result of thirty-five years' clinical study of the effects of alcohol in all forms of low febrile diseases, he has never yet found an instance in which it increased the cardiac force or the efficiency of the circulation. Place this negative statement against the very positive assertions of so many other observers, and we have an illustration of how difficult it is to get at therapeutical truth, and how much must be allowed for the "personal equation" in the observer.

The work as a whole is strongly conservative in its tendencies; the younger men "whose apprehensive senses all but new things disdain" will call it old-fashioned, but they will find in its pages the ripe wisdom of a keen and conscientious observer who has arrived at conclusions after study and deliberation, conclusions from which at times we may differ, but which deserve our consideration and respect.

In one matter the work is the most distinctively American practice which we have. From his long connection with the American Medical Association and with American journalism, Dr. Davis has become thoroughly familiar with the good work done year after year by men who, far from the great centres, have placed their contributions in local Journals and the Transactions of State Societies, from the quiet solitudes of which he has in many instances gleaned most useful information, and the work abounds with references to the communications of men in every section of the country.

It has been said that the climate of Chicago is unfavorable to careful proof-reading. We do not wish to be too critical, but there are a *few* errors which spoil one's pleasure in reading. The proper names, particularly of foreigners, need revising. At p. 28 the average temperature of the body is given as 55° C. (78.6° F.). One of the most curious errors is at p. 843, where the words "*frematoid or fluted worms*" are used instead of trematoid worms or flukes.

The index is a striking example of how such a valuable adjunct to a book should not be prepared. It is largely an index of authors' names and therapeutic means. Thus, under the letter B, of fifty-three references, only three are to diseases, and under *brain*, only one reference is given, *inflammation of*. The fevers are all grouped under the word *fever*, without any other references to special forms.

2. The work of Dr. Loomis is in many respects a great contrast. It, too, is a revision and elaboration of the lectures on Medicine given at the University of New York, but we miss in it the special features which make Dr. Davis's lectures so valuable. We do not feel the author's personality so strongly, which is of course not to be expected; and the work is more like the general run of text-books on the subject, and in so being has more than compensating advantages as a manual for students. It is systematic; the lecture form has been obliterated; it is well arranged and fully illustrated.

An introduction of eight pages, on Inflammation, opens the work, and the diseases of the respiratory system are at once considered. Croup is regarded as a distinct disease, and the characteristic differences which are given certainly serve to distinguish it from diphtheria.

The prevalence of pneumonia is stated to increase from the pole to the equator, and is more common in the Southern than in the Northern States, an opinion which, as we noted, is opposed to Dr. Davis's observation and research. In the compass of a page a very strong case is put in favor of the view that it is an acute specific disease. In its treatment Dr. Loomis recommends, as the result of the past five years' experience, that the patient be brought under the full influence of opium, and held in a state of comparative comfort by repeated hypodermic injections. In this way the primary shock is well sustained, and the chance of heart failure is lessened. The relief and comfort which it gives are sufficient to commend its use. The drug should be stopped as soon as the infiltration is com-

pleted. For cardiac failure, alcohol is given the first place, and to reduce high temperature, quinine in doses from grs. x to xv is preferred to cold. In his treatment of the disease Dr. Loomis occupies a mid-position between Dr. Davis with his poly-pharmacy and Dr. Bristowe with "nature and nurse." It is most instructive to read the sections on the treatment of this disease in these three works. Dr. Bristowe, in a little more than a page full of qualifying phrases, such as, "may possibly," "probably," "perhaps," as regards drugs, gives most rational advice, and, while treating ordinary cases expectantly, he is in many quite prepared to supplement this plan by other measures. Alcohol he also regards as indispensable in certain cases.

In the treatment of empyema Dr. Loomis gives very clear warning against washing out the cavity, and his recent experience is very positively against it, having on three occasions had reason to believe that death followed the injection of weak carbolic acid solutions.

The author's position on the relation of the bacillus to tubercle is put as follows: "The presence of a distinct bacillus in connection with tubercle, and its absence in all other morbid conditions, are generally confirmed by the most competent observers. The etiological relation of this bacillus to phthisis rests solely on the demonstration of Koch. Observers are not wanting who deny entirely, not only the etiological relation, but even that this bacillus is confined to the tubercular tissues—but they fail to present satisfactory proof of such statements." The question of the contagiousness he holds is one to which clinical observation has given no conclusive answer. In the treatment of phthisis the author places great confidence in quinine, believing that no drug has equal power of arresting phthisical processes in the early stage.

In the section on Diseases of the Digestive System and Diseases of the Heart, we notice nothing for special comment; they are carefully prepared and well illustrated.

In the treatment of uræmia the use of morphia is strongly recommended to arrest the spasms, induce sweating, and facilitate the action of cathartics and diuretics. The arterio-capillary fibrosis of Gull and Sutton is recognized as a tolerably well-defined disease, characterized by hyaline-fibroid changes in the arterioles and atrophy of the adjacent tissues, and clinically by a state of high arterial tension. The vascular changes are primary, the renal and cardiac secondary.

Typhoid fever is regarded as a miasmatic contagious disease, the specific poison of which is in the fecal discharges, but is not active when these are fresh, requiring to undergo a development outside of the body, either in the excrement itself, or in soil saturated with it. In the treatment of the fever the cold bath is favorably spoken of, when employed with care and judgment. In the majority of cases the temperature can be kept below 103° by quinine, but there are some which require the cold bath as well. In such cases Dr. Loomis's rule is: after reducing the temperature to 101° or 102° F. by a cold bath, to administer an antipyretic dose of quinine, and thus delay the recurring rise. The whole subject of the treatment of this important disease and its complications is most carefully and judiciously considered.

In typhus fever the author speaks most strongly of the value of fresh air in neutralizing the poison, and advises the use of tents in every epidemic. He urges caution in the employment of alcohol, and gives an exceedingly interesting account of the fever tents of Blackwell's Island

in 1864, where the use of stimulants was reduced to a minimum, and yet the death-rate was only 1 in 16 against 1 in 5 at Bellevue Hospital.

Under the term "continued malarial fever," there is a very full account of the much-discussed "typho-malarial fever." It is believed to be the result of the presence in the body of malaria and a septic poison, and in its morbid anatomy and symptomatology is a combination of the two diseases. In cities where malaria prevails sewer-gases seem to furnish the septic element which is so essential for its development. We gather that Dr. Loomis does not believe that the septic element is actually the typhoid poison, although the intestinal lesions which he describes are almost identical with those of enteric fever.

The article on acute rheumatism is very brief; the complications are simply referred to, and the section on the whole is disappointing. The author has given up the use of the salicylates, believing that they cause depression of the heart, increase the liability to endocardial mischief, and promote relapses. He now gives carbonate of soda to neutralize the urine, and morphia hypodermically to relieve the pain.

The concluding section on Diseases of the Nervous System contains a brief, but good summary of all the more important affections.

The author has produced a clear, practical, and useful text-book, one which can be recommended to the student as a good companion in his hospital work, and to the busy practitioner as a safe guide in diagnosis and treatment. The illustrations are for the great part original, and well executed; the execution of some of the cuts is very good, of many others rather indifferent. The work is very free from typographical errors. There is one little mistake, due no doubt to a slip of the pen, and it reminds us of the remark of a student who had just come from a clinic of Sir William's, at University College Hospital, London. "Why!" said he, "Jenner is not such an old fellow after all. I thought vaccination was discovered years ago." Dr. Loomis has written *Sir William Jenner*, instead of *Edward*. The Gloucestershire physician had tardy public and professional, never court recognition, and his reputation is now, as his merit was then, above titular distinction.

3. Dr. Bristowe's work needs no words of commendation from us. The profession in Great Britain has endorsed its reputation by calling for five editions within seven years. The present differs from the fourth chiefly in the incorporation of recent views on infective organisms, and in a new introduction to the section on diseases of the heart. While to many an objection to this work is in the scanty details of treatment, yet there is much force in what the author says in the preface, that a man is more likely to make a thoughtful physician and benefit his patient by adapting drugs and methods to the exigencies of cases, than by following "the stereotyped procedure of some predecessor." He hesitates—many do not—to force his "own routine and trivialities of practice upon students," and contents himself with inculcating general principles, "and pointing out the specific virtues of certain drugs."

W. O.

ART. XVII.—*Malaria and Malarial Diseases*. By GEORGE M. STERNBERG, M.D., F.R.M.S., Major and Surgeon U. S. Army; Member of the Biological Society of Washington; late Member of the Havana Yellow Fever Commission of the National Board of Health; Corresponding Member of the Epidemiological Society of London, etc. 8vo., pp. 329. New York: William Wood & Co., 1884.

THIS volume, announced last year, was published some time during the summer. It was looked for with much interest by practical physicians both in civil and military circles, and proves to be, as was expected, a work of considerable interest and value. Coming to us fresh from the hands of its distinguished author, it arouses an interest that some of the volumes of the series to which it belongs have failed to excite. The subject is one in which Dr. Sternberg is known to have long been deeply interested, and while, as we learn from the preface and the text, he fully recognizes that the unsolved problems connected with it are not likely to be settled by the pen, its preparation has afforded him a favorable opportunity to review the literature of the subject, and to compare the recorded experience of recent foreign authors, whose works have not been republished in this country, with that of physicians in the malarious sections of the United States. Graceful acknowledgment to the authors from whose experience he has drawn, is made in the preface, and precise bibliographical references are subscribed at the foot of almost every page. In truth, every page bears testimony to the discriminating industry with which the author has searched the older and the recent writings upon the subject. But the evidence of his own extensive practical knowledge is no less ample, and that which he has to say is interwoven with that which he has quoted from the writings of others, with a deftness that does credit alike to his scientific acumen and his literary skill.

The word malaria is not used in its etymological sense as a general term to include all kinds of bad air, or even all forms of disease-producing bad air. It is used in the much more restrictive sense, as denoting "a special kind of poison, not necessarily aëriiform, which produces certain well-defined morbid phenomena, namely, the periodic fevers." This test of malaria, the author strongly insists upon—that it is known by its effect in causing the periodic fevers. It is certainly true that an intermittent or remittent pyrexia cannot be taken by itself as evidence of malarial poisoning; not even the curative power of the cinchona alkaloids can be accepted as an absolute test; nevertheless, there is no difficulty in recognizing typical intermittent fever, in which a well-marked paroxysm occurs daily or every second day; and the prevalence of this form of fever, at least during certain seasons of the year, must be accepted as the test of the presence of malaria, in any particular region.

Dr. Sternberg strongly inclines to the opinion, which we hold with him, that the kind of malaria under consideration does not produce other forms of fever, and especially continued forms, not curable by quinine. The truth of this opinion is a matter of very serious importance to general medical knowledge, and a failure to recognize it has been the cause of endless confusion of thought, vagueness of teaching, vitiation of statistics, and mistaken medication. It is open to question whether an ephemeral fever (*febricula*) is ever an intermittent of a single paroxysm—a fever due to malaria. Such ephemeral fevers occur in non-malarious regions

on a variety of causes. In malarious districts it is, however, the fashion to attribute every case of ephemeral fever to malaria.

The author questions the propriety of ascribing the continued fevers of warm latitudes, known as *acclimating fevers*, to malaria. He seeks also to establish, and with success we believe, that neither so-called continued remittent fever, nor the idio-malarial fever of Edward Miller, nor Naples fever, nor Roman fever, nor Malta fever, nor Rock fever, nor mountain fever, nor other not truly periodical local fevers, which have commonly been attributed to malaria, are in fact due to that cause. Some of them are clearly due to the poison which causes enteric fever, others to causes not yet well worked out, but malarious, in the sense in which Dr. Sternberg used that term, they certainly are not. He also emphasizes the fact that the endemic continued fevers of the United States, which are often wrongly attributed to malaria, are in reality, in many instances, atypical or imperfectly developed forms of enteric fever.

With reference to "typho-malarial" fever, Dr. Sternberg is not satisfied (we think the expression might be stronger) that intermediate forms exist between periodic and enteric fevers.

Part I. treats of malaria.

Malaria is defined as "an unknown poison, of telluric origin, the cause of the periodic fevers." The mode of infection or of intoxication is briefly, but clearly discussed. The author is unwilling to concede, at the outset, that in the cause of the periodic fevers we have to deal with a living germ capable of reproducing itself outside the body, and that those diseases fall under the head of the "miasmatic infectious" diseases of Leibermeister. He prefers to regard the manner of the action of the cause, whether by "infection" or by "intoxication," as unsettled.

The chapter on "Speculations and Researches relating to the Nature of Malaria," is written in a truly scientific spirit. The older authorities concurred in confessing ignorance of the definite chemical and physical characters of malaria. The author regrets that he does not find himself in a position to give a more definite answer to the question, What is malaria? He regards it, however, as right to review the researches thus far made, and the speculations that have led to them, in order to indicate the direction which future investigations should take.

Until recently the opinion commonly held was that of Lancisi, namely, that the malarial poison was of a gaseous or æriform nature. Of late, however, there has been a growing disposition to believe that it is particulate and organized; in other words, a living "germ" or micro-organism. This view is not new. It was formulated by Lucretius (95 B. C.). The author has overlooked the following passage in the writings of M. Terentius Varro, a contemporary of Lucretius (116-27 B. C.), which likewise formulates this view with singular distinctness: "*Si qua erunt loca palustria crescunt animalia quedam minuta, quæ non possunt oculi consequi, et per aëra intrin in corpus per os et nares perveniunt atque efficiunt difficiles morbos.*"

In modern times Linnæus (1778) and J. K. Mitchell (1859) gave prominence to this theory of the causation of the periodic fevers. It is hardly worth while to combat the view that malarial fevers are produced by gases well known to chemists, the toxic properties of which are quite different from those exhibited by the unknown agent malaria. But with reference to the suggestion that malaria may be some complex nitrogenous substance présent in the air of marshes and other malarious localities,

some outcome of the vital activity of micro-organisms, the pabulum for the rapid multiplication of which may exist in the organic matter of malarial soils,—with regard to this suggestion the author cannot speak with the same confidence. In *sepsin*, the ptomaines and the proteids obtained by Weir Mitchell and Reichert from serpent venom, we have examples of such substances capable of producing the most violent toxic effects in very small doses. The theory of Bence-Jones of the mode of infection and pathogenic action, based upon the supposition that malaria is a poison of this kind, is not accepted, its weak point being that “during the remission probably the poison is reproduced until sufficient is formed, in from one to three days, to go through the same action again.”

Dr. Sternberg suggests two other explanations:—

“First. Malarial poisoning may be an intoxication in which the toxic agent is not reproduced within the body, and in which the paroxysmal febrile attacks are secondary phenomena, resulting remotely from injury to the nervous system, caused by the direct action of the poison, and immediately from a secondary cause, such as chill, indigestion, vitiated secretion, etc.”

“Second. The poison may be reproduced within the body by the same micro-organisms which are concerned in its production in the soil, and which may gain entrance to the body by the respiration of atmospheres in which they are suspended, or by the ingestion of malarious waters.”

Still another hypothesis is that malarial poisoning results from infection by low organisms, present in a malarious atmosphere, which *directly* produce the phenomena ascribed to malaria, but which do not multiply within the body of the infected individual.

Finally, the malarial poison is supposed by many to be a *living germ, capable of self-multiplication within the body* of an infected individual, as well as in the malarious soils, which are its normal habitat. According to this view, the morbid phenomena are accounted for by the direct action of the malarial parasite, and the periodicity which characterizes malarial fevers is supposed to result from circumstances relating to the life-cycle and periodic development of this micro-organism.

Dr. Sternberg considers the observations and experimental researches bearing upon the two last-named hypotheses with great carefulness and fairness. He then seeks to estimate their value.

The researches of Salisbury (1866), Bolestra (1870), Lanzi (1876), Eklund (1878), Klebs and Tommasi-Crudeli (1879), the author's experiments bearing upon the work of the last-named observers, conducted under the auspices of the National Board of Health, the labors of Marchiafava, Cuboni, Peroncito, Ceri, and others, finally the results of the investigations of Laveran (1881) and Richard (1882), in France, are described and critically examined. The difficulties attending such investigations are indicated; the extreme liability of making pseudo discoveries, and the consequent importance of special scientific training and of a truly conservative spirit on the part of the investigator, are pointed out and urged upon the attention of the reader.

The circumstances relating to the production of malaria give very strong support to the belief that the poison which is produced in the soil—in the presence of organic matter, ground-water and ground-air, and under the influence of an elevated temperature—is a living organism or a chemical product evolved during the active growth of such an organism. This being admitted, the following possibilities present themselves for consideration:—

(a) Malarial poisoning may be an *intoxication* resulting from the respiration of an atmosphere containing a toxic agent produced by living organisms in the soil.

(b) It may be an *infection* resulting from the respiration of an atmosphere charged with malarial germs, born in the soil, which enter the circulation and multiply in the blood, or in special organs, and produce *directly* the morbid phenomena which characterize malarial diseases.

(c) Malarial intoxication may result from infection by malarial germs, born in the soil, which multiply within the body of the infected individual, and thus produce a toxic chemical agent to which the morbid phenomena are due.

In this case it is not necessary to suppose that the malarial parasite invades the blood. It may remain in the alimentary canal, where it would find abundant pabulum in the food ingested, and where the poisonous products would during the active growth find ready access, by absorption, to the circulating fluid.

The second (b) of these hypotheses, that urged by Tommasi-Crudeli, and the believers in the *Bacillus malarie*, is that which has of late received the greatest consideration; but it seems to the author to have less in its favor than either of the others. He regards the third (c) with the greatest favor, and points out that it is especially worthy of the attention of future investigators.

This part of the book is written in a spirit of judicial impartiality, too rare in current medical literature. Aside from its value as a summary and criticism of conflicting views upon an obscure subject of the most general and absorbing interest, it is admirable as a model of the manner in which the facts bearing upon unsettled scientific inquiries should be presented in literary review, and as such we venture to urge it upon the attention of investigators, both in the laboratory and at the bedside. The facts upon which an hypothesis is based should be sifted with the mind of the judge, rather than colored by the fancy of an advocate, before they are adduced as evidence. Certainly they should be able to stand close scrutiny as to their veritableness, relevancy, and common interdependence.

The general effects of malaria are next considered, and then the antidotes to malarial poisoning and prophylaxis. The chapter on general distribution is a reproduction of Creighton's translation of the account of the subject in Hirsch's Handbook of Geographical and Historical Pathology, the author regarding any attempt to improve upon the work of Hirsch as useless.

Part II. treats of Malarial Diseases.

Under the heading Malarial Intermittent Fevers, ague and its varieties are considered. The latter comprises masked intermittents, pernicious intermittent, algid pernicious intermittent, and comatose pernicious intermittent (congestive fever).

Under the heading Continued Malarial Fevers are considered simple remittent fever, ardent malarial fever, adynamic remittent fever, pernicious remittent fever, and complicated remittent fever. The latter variety comprises those cases of all the other types which are modified in important particulars by cerebral, enteric, or gastric complications.

The final chapter is devoted to the subject of hemorrhagic malarial fever, which might properly be included under the heading complicated malarial fever. But, inasmuch as the nature of the complication is not definitely known, and as the term hemorrhagic simply expresses a clinical fact, but does not commit us to any theory as to the course of the hæmaturia, there can be no objection to the designation, which does not apply with

equal force to the other clinical varieties of malarial fever, that have been separately described, *e. g.*, pernicious intermittent and remittent fever, ardent malarial fever, etc.

The second part of the work is ably written, sufficiently full and explicit for the reference of the practitioner, and up to date. It is largely and confessedly a compilation, and therefore lacks much of the impress of the author's individuality, which constitutes the charm of the first part. In pointing out this fact we are not unmindful that judicious compilation is an art that is alike necessary and productive of the most useful results.

Dr. Sternberg's work is an exceedingly well-timed, satisfactory, and useful book. J. C. W.

ART. XVIII.—*Clinical and Pathological Observations on Tumors of the Ovary, Fallopian Tube, and Broad Ligament.* By ALBAN H. G. DORAN, F.R.C.S., Assistant Surgeon to the Samaritan Free Hospital, formerly Anatomical and Pathological Assistant to the Museum of the Royal College of Surgeons of England. With thirty-two illustrations. 8vo., pp. 189. London, 1884.

ANY book from the pen of a member of the staff of the Samaritan Free Hospital is sure to present something of interest and worthy of consideration. Anticipation is not lessened when the title-page bears the name of a gentleman well known from frequent contributions to journals and numerous valuable papers in the transactions of societies, on the pathology of ovarian and pelvic tumors. This, his first contribution to standard literature, is of the scientific and practical character to be expected from the position he occupies and the rich field of observation at his command. The material upon which it is based is derived from six hundred and five abdominal sections, at which he has been present as operator or assistant, from November, 1877, to March, 1884. Of these, three hundred and sixty-six were operations for the removal of multilocular ovarian tumors.

The two aspects of the book are by no means so well balanced in the body as on the title-page, the pathological far preponderating over the clinical. For obvious reasons this is to be regretted, without disparaging the one or unduly estimating the other. The book would certainly be more generally useful and interesting had it been more closely directed to the practical aspects of the subject. As presented it is not a systematic treatise, either pathological or clinical, but an assemblage of chapters on various subjects not necessarily connected with each other, in which cases are referred to and some points of them noted, without being detailed, and in which a few practical points are so well presented that the reader cannot but wish that they had been all given. It is a book, then, for the practitioner rather than the student; indeed, it is not at all adapted for the latter, but will be perused with interest and profit in direct ratio to the amount of practical knowledge of the subject the reader already possesses. It may seem unfair not to allow an author his own choice as to manner of presentation, but it seems clear that precisely because the work has been prepared for practitioners will it occasion great disappointment to find the most important practical points of the subject, some of them

yet undecided questions, carefully avoided. The preface states that "statistics of mortality, the merits of the antiseptic system, the use of the drainage tube, the weight of tumors, and the nature of their fluid contents" are not to be touched upon.

The first two chapters are upon multilocular and glandular cysts. In the very first paragraph the author plunges into the minute pathology of the origin of ovarian tumors by a denial of the existence of Pflüger's tubes, and a consideration of the sources of error in regard to them. Without attempting to follow him through those portions of the work where illustrations are necessary to a clear understanding of the text, his opinion as to the origin of multilocular tumors is that it takes place in some arrest of the downward progress of the normal degeneration of the atrophying follicles, rather than in the dilatation of mature follicles:—

"I cannot help thinking that the origin of cystic disease is to be sought from careful and prolonged study of the different changes which follicles in process of atrophy may undergo, when influences which it may be impossible to trace prevent the atrophy from ever being completed." . . . "The most recent labors of embryologists and pathologists all point to a follicular origin for cystic disease of the ovary."

That portion of the second chapter relating to fused ovarian cysts is of great interest and practical value. The tendency of ovarian cysts to open into each other when in contact is well known, and the fact, therefore, that multilocular cysts from each ovary sometimes become fused together is not surprising. The condition of things brought about by this process may be such as to puzzle the most experienced operator, and when pelvic adhesions also exist very much increases the difficulties of the operation, and consequently adds to the danger for the patient. The author gives the leading particulars of five cases of this kind which he has seen, one of which was fatal:—

"In the five cases the second pedicle, that is, that which was recognized as a pedicle after another had already been detected, was usually taken at first for an adhesion, and one of the two pedicles was always much smaller than the other."

"All were very troublesome to the operator. In all, the pedicles were secured by transfixion, the process being invariably difficult. As a rule, adhesions existed, and the uncertainty produced in the minds of the operator and his assistants, when an anomaly of this kind is first inspected, is an element which adds to the tediousness of cases of this description."

In regard to the technique of diagnosis the author assumes that the reader is acquainted with the writings of experienced operators, and he only just touches upon some of the minor points, which are not unimportant, as is nothing relating to the diagnosis of abdominal tumors, but which may be readily overlooked or neglected by the inexperienced. As to one of these we must take issue with him; the pockets do not, in our opinion, give proper warmth to the hands, nor are they better than immersion in warm water. It seems strange that the softening effect of water in improving the touch should escape notice where special attention is being paid to lesser details.

A possibility of diagnosis from chemical examination of the fluid contents of ovarian cysts is denied by the author, as by other late authorities. We demur, however, to the statement that "chemical tests are of a kind unsuitable for the surgeon," and suggest that it is not necessary for him to "carry spectrosopes and other apparatus about with him," in order to avail himself of their aid in diagnosing abdominal tumors. We

looked here with deep interest for some facts, or at least some expression of opinion, in regard to the presence or absence of the ovarian cell, first described and held by Dr. Drysdale as important in a diagnostic view. The subject is not mentioned, and this cannot but be considered a serious omission in a work containing so much relating to the microscopic appearances of the solids, and where there seems to be a right to expect some notice of it.

The different appearances presented to the eye, upon opening the abdomen, by dermoid and parovarian cysts, multilocular ovarian and uterine tumors, are stated and commented on, as well as the changes in appearance which are produced by inflammation and twisting of the pedicle. A careful study of these seems to the author to justify the statement that "the smoother and shinier and the more silvery the cyst wall appears when exposed by abdominal incision, the better the case will be for the patient and for the operator."

The third chapter of the book is devoted to the consideration of the parovarium and its relation to cystic disease of the broad ligament and to simple broad ligament cysts. It is an excellent chapter, and it would be difficult to refer a student to any work where he could get a better understanding of the subject. By means of a diagram the relations of the different organs are shown, and the different points of origin of cysts indicated. A very large proportion of the cystic tumors of this region are not of parovarian origin. The author believes that this structure has been as misleading in the pathology of the ligament as Pflüger's tubes in regard to the ovary, and, although it is not distinctly stated, it is to be inferred that the origin of cysts is independent of the parovarium in the majority of cases. He, therefore, prefers the term "simple cyst of the broad ligament," rather than "parovarian cysts," when speaking of cysts of this region independent of the ovary:—

"It is often from a minute cyst of this kind, free from the parovarian tubes, that is developed the large cyst commonly termed parovarian, with its thin transparent wall, its single cavity, lined with flat or low columnar epithelium, and its clear watery contents. I have examined over one hundred broad ligament cysts of this kind, perfectly free from the parovarium and from the tube, and ranging from one-fortieth of an inch to one inch in diameter."

A characteristic of cysts arising from the parovarium is to develop papillomatous growths on their interior. Upon bursting of the cyst wall these papillary growths spread over the broad ligament and neighboring organs with great rapidity, and to this form of tumor the next chapter is entirely devoted. The possible presence of these papillomatous growths in the interior of any simple pelvic cysts is given as an argument against tapping. In deciding against this measure, the author acknowledges that he has the high authority of Mr. Keith against him, as he will continue to have the practice of every practitioner who has ever had a permanent cure of such a cyst from a single tapping. However low may be the mortality of the operation for extirpation, all but those who operate very frequently will prefer the lesser dangers of tapping. That the operation for simple cyst of the broad ligament is very easy and simple, and the mortality exceedingly low, is well known. To merely say, however, that "this subject has been discussed by Mr. Tait," is hardly just to that gentleman.

Although the removal of these cysts is generally easy, the author recognizes the clinical fact that sometimes, when they burrow downwards, they are without any proper pedicle, and their removal is exceedingly difficult.

It is here that the process of enucleation may come into play, and the term is certainly preferable to that of "shelling out," which is repeatedly used by the author. He does not deem it worth while to mention the name of Dr. Miner, of this country, in connection with this procedure. We say so, because it would scarcely be fair to presume that he could be ignorant of the origin of so important a modification of the operation of ovariectomy. We hoped to find here some notice of a procedure suggested by our limited experience, and which we regret not having put in force in one of these cases of sessile cystic growths; that is, to cut out a portion of the walls, and stitch the edges of the opening to the abdominal walls. By this, the dangers of separation of close adhesions deep in the pelvis could be avoided, and by drainage doubtless a permanent cure effected.

One chapter of the work is on Dermoid Cysts of the Ovary, a departure from the normal, which, to the author, "appears to be closely and inseparably linked with some of the most profound mysteries of organic life." It contains the pathological particulars, and the peculiarities observed during operation of thirty-one observed cases. The relation of this form of tumor to malignant disease is discussed, and the statement made that Mr. Thornton's experience has given several cases where malignant deposits have recurred in the pelvis two or three years after the removal of large dermoid cysts containing soft white growths that strongly resemble sarcomata. Acknowledging the difficulty of a decision as to many forms of outgrowth from dermoid cysts, the author says:—

"With regard, however, to the sarcomata, these growths are considered to be made up of more or less embryonic connective tissue. In dermoid cysts, connective tissue exists in all its stages of development, and the last two examples which I have described show that the perfect tissue may be seen passing into less well-developed structures, bearing every resemblance to the new growths known as spindle-celled sarcoma and round-celled sarcoma elsewhere. What is far more serious is the fact that experienced clinical authorities declare that dermoid cysts, with ill-developed tissue of this kind, give rise to all the worst results which follow the development of sarcomata elsewhere, so that it is, pathologically speaking, not illogical to speak of sarcoma of a dermoid cyst as a tumor of a tumor."

In the chapter on Solid Tumors of the Ovary, the author teaches that it often becomes the surgeon's duty to make an exploratory incision. He has seen fourteen cases in which nothing was removed; none of them proved fatal, and he places the risk of this procedure very low. If the tumor proves to be ovarian, it may be removed, and even if sarcomatous in character, "it certainly does not tend to recur as rapidly as a sarcoma in other parts of the body." It is matter for regret that diagnosis, in connection with solid pelvic tumors, is not considered in detail, or at a length at all commensurate with its difficulties.

Two chapters are devoted to the Operation of Ovariectomy, but the subject is considered in a fragmentary character; the first is on the abdominal wound, which he thinks should be free, and on adhesions; the second is devoted to the complete intra-peritoneal ligature of the pedicle, and is interesting, but the arguments have been closed, and the question is settled. One important point must not be overlooked; he fully recognizes it, but does not emphasize it as it deserves to be. In the following paragraph we furnish the italics:—

"The shock during, and immediately after the separation of extended adhesions is often very marked, *especially if the patient be not thoroughly under the influence of the anæsthetic.*"

There can be no question of the truth of this proposition, and the operator on abdominal tumors should instruct his administrator of anæsthetics to deepen these effects when adhesions are numerous and firm.

The chapter on Morbid Conditions of the Kidney, associated with ovarian tumors, is one of the best, if not the best of the book. The importance of the subject cannot be over-estimated, and the lethal influence of these organs is so strikingly shown, that hereafter no "general surgeon" will continue to believe "that nothing can destroy life after ovariectomy but septicæmia or peritonitis"!

"I wish to record the fact that in thirty-two out of over forty necropsies that I have made on the bodies of patients who have died, either after ovariectomy, or with large ovarian tumors in the abdomen, I found that the kidneys presented very distinct morbid appearances."

The different kinds of urine are given, and their probable influence on the operation, the effect of pressure on the ureters traced backwards to the kidneys, and the changes there produced are described. The author fortifies himself by quotation of the views of Mr. Marcus Beck, as given in *Reynolds's System of Medicine*. An abstract of the morbid appearances presented by the kidneys in each of the thirty-two cases is also given.

There are several other chapters which we cannot examine in detail. All are interesting and instructive, because based upon clinical observations. The book cannot be considered other than as a most valuable contribution to the subject. We must express regret, however, that the work of our countrymen receives so little notice, even in regard to points, as has been mentioned, where they deserved it; but three names belonging to this country appear in its pages: Nathan Smith, Dr. Noeggerath, and Dr. Skene. We regret, too, the fragmentary manner of presentation of the subjects considered, already alluded to, and trust that one who shows himself so able, and who is so well supplied with clinical material, will before long furnish a more systematic and methodical treatise. Whatever shortcomings may be found in this production, there is no question as to the spirit which pervades it; this is thoroughly and purely scientific, as may be seen from the following:—

"I have searched for cases like these for several years, but these two examples seem to be a protest against dogmatic pathology. The blank formula 'such and such a disease never does so and so,' must not be filled up and applied rashly by the pathologist. Yet it should not be forgotten that the reverse principle, this specimen is described in order to disprove ——'s assertion 'that such and such a disease never does so and so'—is an equally fruitful source of error. To avoid both these sources of error, I have described the above cases at length—perhaps, at tedious length—but they represent what I have seen, and I leave others to draw inferences from them."

J. C. R.

ART. XIX.—*The Principles of Ventilation and Heating, and their Practical Application.* By JOHN S. BILLINGS, M.D., LL.D. (Edinb.), Surgeon U. S. Army. 8vo., pp. 216. Seventy-two illustrations. New York: The Sanitary Engineer, 1884.

THE law of demand and supply is well illustrated by this book, and the circumstances of which it is the outcome. Tracing back their train, one

arrives at the need of a practical guide in the application of the principles of ventilation and heating, which shall give directions from a point of view which may be called subjective. The object sought is the health and comfort of the human body, and the subjective knowledge of what practically affects it for good or ill may be conceived to be best attained by a mind well trained in medical science, to which has been added a large experience in the practical study of questions relating to the construction of human habitations.

Many a high-sounding scheme for "the best ventilated building" has come to disappointment, and waste of money and life, by the undue predominance of professional ideas on one side or the other. The best results may come from medical knowledge, which keeps in view the importance of the principles treated in this book, with a due comprehension of the conditions that beset the architect, when there is also the happy faculty of imparting knowledge in a practical way. Such a combination is rare enough to make it of great value as a source of information, which is especially liable to be asked for by those who have not the time or interest in the subject to study it for themselves. Indeed the idea has been too common in regard to ventilation, that it is a subject requiring little study; that its whole secret is to be found out by some magic rule of thumb. Many persons think they know all about it, so there is no end of quackery in this matter. The holes they make in the walls and floors of their rooms, and the pipes and flues which honeycomb their houses, usually work the wrong way. The writer of this article is often reminded of his college professor, who taught physics, and who, wise by experience, was never caught by an unsuccessful experiment. For example, he might say, while suiting the words to the action: "Now, if I let fall this ball here, the other one should rise there—but it doesn't!" A good reason could always be given for a failure, however.

Many who would wish to be better informed shrink from the study of the laws of heat and pneumatics necessary to demonstrate to their own understanding, the rationale of the principles that are the key to the whole subject. Probably many readers of this book, lucid as it is, and shorn of much technicality, will sympathize with the young architect who was its "immediate cause" by his request of the author for "some plain, practical directions as to the best methods of arranging the ventilation of a building, to be given, as far as possible, in the form of specifications which can be readily understood by an intelligent builder, and not in the form of abstruse mathematical formulæ." He complained that the books he had examined contained only "long-winded scientific speculations about the physics of gases," etc., and that he "could not obtain from them a simple statement as to how to ventilate a large school-house," the problem that then interested him. Naturally the author finds a ready counterpart of his inquirer, in the kind of aspirant for medical education who "does not wish to take the trouble to learn anatomy and physiology," but wants ready-made information for common use, conveniently packed "in a vest-pocket manual, which can be consulted as occasion demands."

A series of papers contributed to *The Sanitary Engineer*, entitled "Letters to a Young Architect on Ventilation and Heating," originally prepared to answer questions sent to that journal, forms the basis of this work, which contains the substance of those papers, the whole being rearranged and in part re-written, and new matter and illustrations being

added. It is not intended to be a systematic manual on ventilation and heating, but rather to present the general principles which should guide one in judging of the merits of various systems of, and appliances for, ventilation, and, as far as possible, without the use of technical expressions or of any but the simplest mathematical formulæ. It is desired to present the subject in such a way that architects will appreciate its importance in their work, and understand its difficulties and the general principles which should guide them in endeavoring to overcome these difficulties.

The author hopes that the volume may serve to meet the wants of architects, physicians, and others whose queries appear from time to time on this subject. His own experience undoubtedly gives him ample warrant for the belief that there is a demand for an explanatory work of this kind. Those who read the book, and appreciate the author's grasp of the subject, will thank the "young architect" for his frank avowal of his difficulty, which found the response ready to the demand; and they will find in the work a mine of information, stated with the directness and force which go straight to the point and waste no time, clearly and intelligibly, and with a wealth of quotation from many authorities of valuable condensed statements of what they have contributed to the subject. The peculiar excellence of the work is in its elucidation of essential and elementary principles, and the plainness with which their application is explained, aided by ample illustration. One can hardly fail to master a few simple laws that govern the production and communication of heat, and the movement of air, which will give a practical insight into the subject, sufficient to make it easy to understand the thousand-and-one apparently confusing variations of the problem of ventilation of houses and rooms, and to reduce the difficulties to simple terms of the application of common principles. Such knowledge as this is invaluable to every physician, if for nothing more than to enable him to extemporize simple methods for the ventilation of sick rooms.

The first three chapters deal with these laws, and the amount of air supply required. As a first axiom to be kept in mind, it is declared, as applying especially to the large cities in our Northern States, that "in this climate, it is impossible to have, at the same time, good ventilation, sufficient heating, and cheapness." "Good ventilation" is defined as not exactly "the removal of foul, and the introduction of fresh air," but as including, "in the great majority of cases, the idea of a thorough mixing of pure with impure air, in order that the latter may be diluted to a certain standard."

The true relations of carbonic acid to questions of ventilation are treated in an interesting way. Its importance is not because it is injurious of itself, even in the proportions found in our worst ventilated rooms, but because it "is usually found in very bad company, and that variations in its amount to the extent of three or four parts in ten thousand indicate corresponding variations in the amount of those gases, vapors, and suspended particles which are really offensive and dangerous; and also because we have tests by which we can, with comparative ease and certainty, determine the variations in the carbonic acid." The normal amount of carbonic acid in fresh air being 4 parts in 10,000, the added "carbonic impurity should never exceed 2 or at the most 3 parts in 10,000 of the air in a room." Convenient methods of testing the air are described.

The production and communication of heat, the movements of heated air in open spaces and in flues, and the effect of different shapes and sizes of flues, are discussed in a brief and well-written chapter. Theoretical formulæ are given and explained, but inasmuch as the results obtained by some of them have to be modified by percentages of allowance for varying conditions, the author does not hesitate to simplify the formulæ, and to discard minute calculations; and gives some easily understood practical rules. The same may be said of the chapter on the amount of air supply and cubic space, of which the author says that "it is just at this point that the young architect or engineer is most likely to become demoralized and discouraged," because of the great diversity of opinion among authorities as the proper methods of calculating the amount. Several methods are given and their fallacies explained; and it is said that the estimates of sanitarians as to the amount of air required are now based upon the observations of De Chaumont, Parkes, and others.

Assuming that the air of an inhabited room should not be so impure as to possess the faint musty odor that may usually be perceived, when, as a product of respiration, the proportion of carbonic acid is increased from the normal ratio of between 3 and 4 parts in 10,000 to between 6 and 7 parts in 10,000, Parkes shows the amounts of air necessary to dilute to this standard to be 3000 cubic feet per head per hour after the first, when the cubic feet of space occupied per head is from 100 to 1000. The author, however, assuming that all the fresh air is to enter through the ducts provided for that purpose, would advise that heating surface, foul and fresh air flues, and registers be provided for an air supply of one cubic foot per second per head for rooms which are to be constantly occupied. This would give an allowance of 3600 cubic feet per head, which he would reduce to 2500 cubic feet per hour, or three-quarters of a foot per second for school rooms, halls of assembly, etc., occupied but a few hours at a time.

The various methods of heating are considered in Chapter IV. The author has come to the conclusion that the statements of the great majority of writers, that direct radiant heat in a room is preferable from a hygienic point of view, is not sustained by evidence that is entirely convincing. He would, however, strongly advise that a fireplace be provided in every room which is to be inhabited in a dwelling-house, but rather for purposes of ventilation than heating, and as a cheerful addition to other means of heating. It should be supplemented, in our northern climate, by indirect radiation from a furnace, or steam or hot water apparatus, the former, next to stoves, being the cheapest. Some very instructive remarks are also made in Chapter VI., on the use of fireplaces and stoves, with illustrations of simple devices for making the latter a means of ventilation.

The careful discussion of the comparative merits and demerits of steam and hot-water apparatus is very practical and valuable, and indicates that the advantages of the latter method, even for cold climates, are yet but little understood.

Concise, practical, and intelligible directions are given in Chapter V. for the placing of flues and registers, and for determining their proper size; and the question of regulating the moisture of air is interestingly discussed. While English writers usually state, that in order to secure health and comfort, the relative saturation with moisture, of air to be respired, should be from 65 to 75 per cent., it is shown that these figures

will not apply to the United States, where even a degree of saturation of only 15 to 20 per cent. is found to be consistent with the absence of discomfort and ill effects.

In regard to the plans of a suburban residence, much exposed to cold winds in winter, given on pages 60-67, illustrating the question of a centralized location of the radiators and hot-air registers or their peripheral arrangement in the outer walls, the latter being preferred by the author, it may be interesting to note that this plan was adopted in the building in question with satisfactory results. For a warmer climate, the author thinks the former plan would be preferable. The very different problem presented by a city dwelling is fully illustrated.

The author pays his respects to various patent systems of ventilation and heating in Chapter VI., and in the next chapter takes up the subject of ventilators, cowls, etc., of which the variety is endless. The results are quoted of many experiments, with various devices for the purpose of giving direction to currents passing through flues or shafts, or for enabling the wind to produce, accelerate, or prevent such currents; fallacies and errors are pointed out, and the philosophy of the principles involved is stated with characteristic clearness. The construction and location of foul air flues and shafts are considered at length, and the doubtful usefulness of some much-vaunted forms of fresh air inlets in the walls of rooms is explained. This chapter is a valuable one.

Passing now to the application of principles, and to the illustration of the methods which have been actually employed, and by which the greatest success in obtaining fresh air appears to have been attained, the next four chapters are devoted to the subject of heating and ventilating assembly rooms, churches, legislative halls, theatres, schools, and hospitals. The general principles governing the ventilating arrangements are comparatively simple, and the basis of all plans and calculations is the amount of fresh air to be supplied. The author adopts as the only safe rule, that laid down by Drs. Parkes and De Chaumont, viz., that when the air in a room has a perceptibly musty, unpleasant odor, to a person entering it from outside, that air is unfit for respiration, and will probably, sooner or later, produce disease. For audience halls, occupied not more than two or three hours at a time, the supply should in no case be less than 30 cubic feet of air per minute, through the regular flues of supply; and in legislative buildings, it should be possible to furnish at least 45 cubic feet per person, with the possibility of increasing it to 60 feet when desired.

Sectional and floor plans are given of the Houses of Parliament and the halls of the House of Representatives; also of a number of noted theatres, and opera houses; and not only are careful deductions made as to what is desirable in the matter in question, but practical and valuable instructions are given on important points in making specifications and dealing with contractors.

The subject of schools is treated in the same practical way, and with a good defence of correct principles. There is a description and plans of the now famous Bridgeport school-house. In this building, contrary to the usual plan, the inlets for fresh warm air are in the inner walls, 8 feet above the floor where the outlets open into warmed exhaust shafts. The plan seems to work well, though experiments described show that about 16 to 20 cubic feet of air per minute was furnished to each of 50 pupils, instead of 30 cubic feet as was proposed. The author does not disapprove this plan of heating, though he says, on page 57, that in such rooms, the

heat production of such a number of occupants is a factor that must be taken into consideration, and there is some danger, by this method, that there will be unsatisfactory distribution of the fresh air when the external temperature is not below 50° F.

The chapter on hospitals is an interesting and valuable one, as was to have been expected. Such buildings have received more attention than others in regard to ventilation and heating, and yet the results are too often unsatisfactory. Several plans are given of one-story pavilions, with long and circular wards, also of some three-story hospitals, including the Barnes, New York, Roosevelt, and Johns Hopkins hospitals, with some very satisfactory results of a long series of careful experiments made in the first named by Dr. Huntington of the U. S. Army.

The last chapter in the book treats of forced ventilation, by heated aspirating chimneys, etc., and an interesting account is given of the use of steam coils to produce a ventilating current in the library building of Columbia College, with plans. The use of fans is also briefly noticed. Formulas and rules are given for making calculations in regard to these methods. The book closes with some ingenious and useful plans for switch-valves for mixing warm and cold air in inlet ducts—an essential device for changing the temperature of in-flowing air without lessening its quantity.

While the work is not intended to be exhaustive in its treatment of the subject, it so goes to the root of the matter as to furnish the information one practically needs in a most valuable way. The book is printed on good paper, but is worthy of a better setting in larger type, and clearer wood-cuts.

It would be a grave omission not to mention the pleasing way in which this dry subject is made fresh and interesting. There is a certain humidity in the style, so to speak, due no doubt to the humor there is in it, that makes it less hygroscopic of the vital juices of the reader, than such works usually are. The author is reminded of many things, by way of analogy and illustration, with which he tersely points his moral or enforces his argument, beginning on the first page with the student who wanted his medical education in a little time, and in a compact form convenient for the vest pocket, and ending on the last page with the ignorant and careless engineer, who had the higher qualification of being somebody's "nephew" or "an active politician;" not omitting to mention the people who were nearly frozen to death by their own fireplaces, nor the schools, the bad ventilation of which was like the old toper's whiskey—"there was no bad whiskey, although some samples were better than others." The style possesses an element of breeziness, that by an agreeable kind of perfusion, and in accordance with the fitness of things, serves an admirable purpose in ventilating the subject of ventilation.

E. C.

ART. XX.—*Diseases of the Heart and Thoracic Aorta.* By BYROM BRAMWELL, M.D., F.R.C.P.E.; Lecturer on the Principles and Practice of Medicine, and on Practical Medicine and Medical Diagnosis in the Extra-Academical School of Medicine, Edinburgh; Pathologist to the Edinburgh Royal Infirmary, etc., etc. 8vo., pp. 782, with 317 illustrations. New York: D. Appleton & Co., 1884.

DR. BRAMWELL, occupied during recent years in teaching in the Extra-Mural School of Medicine in Edinburgh, and as Pathologist to the Royal Infirmary, formerly enjoyed at Newcastle-on-Tyne the advantages of the double position of physician and pathologist to the infirmary. The good results of a training which has enabled him to acquire large experience at first hand and at the same time, both in pathological anatomy and in clinical pathology, were apparent in his excellent work on *Diseases of the Spinal Cord*, issued two years ago, and well received in his own and in this country as a text-book.

The results of such a training are still more plainly seen in the present treatise. It is the book of a teacher for students—not only for beginners, but also for students of older growth and large experience. Here we may say, that not being subject to the science-primer and quiz-compend levity, we hold that even beginners in the study of medicine will save money, energy, and time by buying and studying the best books which treat fully and connectedly of their subjects; that the difficulty about the short-cuts to knowledge is that they are usually no thoroughfare, and that those advising their use are apt to prove false guides. For he who would arrive satisfactorily at the goal must follow the arduous path which has been laid out by honest workers at great labor and expense.

The habits of the class-room are shown in the ordering of the topics and in the almost chart-like arrangement of the various divisions, sub-divisions, and headings. This elaborately methodical arrangement leads to repetitions and is inconvenient in continuous reading, but it greatly facilitates the study of the subject and reference to particular divisions of it. We learn from the preface that the subject matter of the work was delivered almost exactly as it stands in the form of lectures to the author's class at the beginning of the winter sessions of 1883-84. It is, however, the result of a long period of preparation, for we are told that during the past fifteen years the author has been constantly thinking and talking about the subject, and steadily accumulating the clinical knowledge and pathological material necessary for the production of such a work.

Dr. Bramwell evidently places a high estimate upon the value of illustrations. Of the 317 which have place in this volume many are full-page lithographs of naked-eye and microscopical subjects. All these lithographs and more than half of the whole number of illustrations are original.

The introductory anatomical and physiological remarks occupy forty-five pages, and fully represent the knowledge of the subject in its present state. At the outset the author emphasizes the fact, too often overlooked, that the heart is not merely a mechanical but that it is also a muscular pump, and that its action presents problems that are partly mechanical and partly vital. He has drawn largely upon Dr. Gaskell's brilliant researches relating to the heart-muscle and its automatic mechanism and the general subject of cardiac innervation, and has not overlooked the recent contri-

butions to the physiology of the heart by Martin, Sedgwick, Sewall, Donaldson, and other workers in the biological laboratory of the Johns Hopkins University. At this point we observe a defect in the book, which repeatedly occurs and is likely to be a cause of some annoyance to the close student. It is the omission of bibliographical references. In view of the fact that the "Studies" from the biological laboratory of the Johns Hopkins University and the *Journal of Physiology* are neither commonly read nor easy of access to a great number of the readers of Dr. Bramwell's book, the following passage, which, without reference or further explanation, comprises all that is said under the heading of "The Arterial Blood Supply of the Heart," may be taken as a fair example to illustrate this fault of omission:—

"As we all know, arterial blood is conveyed to the cardiac muscle by the coronary arteries, and until quite recently it was supposed by many of our leading physiologists and physicians that in consequence of the relative position of the parts, the orifices of the coronary arteries must of necessity be closed during the systole of the ventricle, the valve flaps being pressed against the orifices of the coronary arteries by the blood stream in its passage from the ventricle into the aorta.

"The recent experiments, however, of Martin and Sedgwick seem conclusively to show that this supposed closure does not occur, and that the coronary, like all the other arteries of the body, are distended during the systole of the heart.

"These observers have shown, by means of careful cardiographic tracings, that the blood waves in the coronary arteries and carotids are exactly synchronous both in normal and diseased states of the circulation.

"It seems certain, therefore, as Dr. George Balfour and others have previously argued, that the blood is propelled into the coronary arteries during the systole of the heart."

Many readers to whom this view is altogether new would be glad to avail themselves of a reference to what may be termed the *bottom facts*.

Chapter II. is devoted to the general pathology of the heart.

The accepted doctrines are stated in a clear, terse, and practical manner.

In the third chapter we find a well-arranged and suggestive method of case-taking set forth, together with a summary of symptoms and the methods and results of the physical examination in cases of heart disease.

Much space is devoted to the discussion of Cheyne-Stokes' respiration, and the theories that have been advanced by Traube, Sansom, and Filehne to explain the manner in which it is produced. This peculiar rhythmical dyspnoea is, as is well known, an ominous symptom, occurring usually, but by no means exclusively, in advanced cases of heart disease, especially of dilated and fatty right heart, atheroma of the coronary arteries, and aortic dilatation, and being in most cases followed shortly by death. It is probably to be accounted for by the fact that periodical variations occur in the amount of oxygen supplied to the respiratory centre in the medulla. The author's discussion of this subject is exceedingly ingenious and interesting. "The respiratory centre in the medulla oblongata probably consists of two parts—one connected with inspiration (the inspiratory centre), the other with expiration (the expiratory centre)." It is, therefore, "the seat of two conflicting forces, one tending to generate inspiratory impulses (the discharging portion), and the other offering resistance to the generation of these impulses (the restraining or inhibiting portion); the one and the other alternately gaining the

victory, and thus leading to a rhythmical discharge." These two parts are differently acted upon by the same stimulus, venous blood exciting the action of the discharging portion and depressing the action of the restraining portion; arterial blood, on the contrary, depressing the action of the discharging portion and intensifying that of the restraining part. Moreover both these parts of the centre are supposed to be in a state of irritable weakness. Starting then at the end of a period of apnœa, we may suppose that the venous blood gradually excites a paroxysm of dyspnœa, (1) by acting directly upon the inspiratory centre itself, depressing the action of the restraining portion and arousing the action of the discharging portion, (2) by stimulating the action of the vaso-motor centre, in consequence of which the arterioles are contracted and the supply of oxygen to the respiratory centre is still further diminished. The excessive irritability of the discharging portion of the respiratory centre tends to excessive discharges by which a condition of dyspnœa is produced. But in consequence of its irritative weakness, it speedily becomes exhausted and the dyspnœa tends to subside. The excessive respiratory efforts during the paroxysm of dyspnœa causes the blood, previously venous, to become arterialized; stimulation of the discharging portions of the respiratory centre ceases; stimulation of the restraining portion is produced; and in consequence of the deficient stimulation and over-exhaustion of the discharging portion, the restraining portion has full swing, and the condition of apnœa is produced. The changes supposed to take place during a paroxysm and pause of Cheyne-Stokes' respiration are illustrated by six diagrams.

Several pages are used—we were about to say wasted—in descriptions of the mechanism of the various forms of the sphygmograph. The author gives preference to Mahomed's modification of Marey's instrument, and to the convenient and portable little instrument of Dudgeon. We confess that the latter has been a disappointment to us. The tracings of Pond's instrument, the mechanism of which has, with modifications, been adopted by Dudgeon, are much more satisfactory, although the instrument is certainly less portable and more delicate. The tracings of the different instruments now in use are so different in certain essential particulars, as the relative length of the up-stroke and the down-stroke, that we believe it would be a good rule in the publication of cases illustrated by sphygmograms to designate the instrument used.

The author holds that the three conditions necessary for perceptible reduplication of the first sound are considerable asynchronism in the contraction of the two ventricles, diminished duration of one or other, or both of the component parts of the reduplicated sound and slow action of the heart.

He also holds the generally accepted view that reduplication of the second sound is due to asynchronous closure and tension of the aortic and pulmonary valve-flaps, and discusses at length the various conditions by which such asynchronous action of the ventricles may be brought about. Other theories, those of Sansom, George Balfour, and Guttmann are also given in brief.

Dr. Bramwell's method of treating the much vexed and unsettled subject of functional murmurs partakes more of the nature of a critical review of the various opinions than of dogmatic or *ex cathedra* assertion. He concludes, however, that the *sudden* propulsion of a *large* blood-wave of *abnormal* (spanœmia) composition into the pulmonary artery, which is

probably in many cases dilated, is an efficient cause for the production of the basic murmur which is heard in the second left interspace in the earlier stages of anæmia. The italics here are the author's, and they illustrate one of his methods of accentuating his utterances. This chapter concludes with brief observations on the examination of the venous system.

With chapter IV. the study of the individual diseases begins. They are considered in 5 groups, as follows :—

- (1) The diseases of the pericardium.
- (2) The diseases of the endocardium.
- (3) The diseases of the myocardium.
- (4) Neurotic affections, which include the purely functional diseases of the organ.
- (5) The diseases of the great bloodvessels.

The congenital malformations of the heart are described, contrary to the usual arrangement, in their proper place under diseases of the endocardium and myocardium.

The section on pericarditis is well given. The morbid anatomy is illustrated by no less than eighteen figures, some of which seem to us, however, neither clear nor necessary. The differential diagnosis is fully considered, and for the most part by means of tables of parallel columns. The treatment is up to date and ably taught. We notice upon page 338 the familiar name of a distinguished American physician incorrectly spelt. Aspiration of the effusion is advised when the action of the heart is seriously embarrassed by its amount or the rapidity of its accumulation, and life thereby endangered. In the directions for the operation the rules laid down by Dr. John B. Roberts, of Philadelphia, are followed. In case of a purulent effusion the sac is to be laid open with strict antiseptic precautions and a drainage tube inserted, the same indications for treatment being observed as in other internal abscesses.

Chapter V. treats of endocarditis and the resulting valvular lesions. This is certainly one of the strongest chapters in a strong book, and will take rank as in many respects the best article upon this group of lesions in any text-book. It is illustrated by no less than sixty-six figures, and takes up 200 pages of the volume. Acute endocarditis is considered first in its "simple" form, later in its "ulcerative" form. Especial attention is directed to the familiar influence of absolute rest in those affections liable to endocarditis as a complication as tending to avert that complication and its serious results.

Sibson's observations on the importance of rest in those affections are quoted at length. The question of the treatment of acute rheumatism by salicin and the salicylates is fully discussed, and the administration of full doses of pure salicin in acute rheumatic endocarditis, after the manner recommended by Dr. Maclagan, is strongly advised. To use the author's words :—

"I cannot help thinking that if this treatment were rigorously carried out in the earlier stages of the attack, the frequency of endocarditis and other cardiac complications would be materially diminished."

The mixed alkaline and salicin treatment is dismissed with mere mention.

Ulcerative endocarditis is not regarded as a specific infectious disease in the same sense that typhoid, scarlet fever, and smallpox are. Inoculation experiments have failed to reproduce the disease. The clinical history is fully given and the *cardiac*, *typhoid*, *pyæmic*, and *ague-like* types are described—a clinical subdivision that appears to us of questionable utility,

and as likely to lead *into* as *out of* confusion. The affection is always fatal, and the subject of treatment is summed up in a few discouraging words.

Mitral regurgitation is due to muscular and relative incompetence on the one hand, and to organic changes in the valve segments on the other. The former is amenable to treatment, and can often be completely cured. The latter is incurable; treatment can only control and modify the secondary conditions and tend to establish and maintain compensation. The treatment appropriate to each condition is separately and clearly set forth. The author regards arsenic as a cardiac tonic of much value, which is too little used in the treatment of mitral regurgitation. He looks upon digitalis properly used as *the* remedy. As regards the treatment of mitral stenosis:—

“The indications are the same, and the methods of treatment are similar to those which have been described as suitable in cases of mitral regurgitation. I need not again enter into details, but must once more emphasize the statement, that in the earlier stages, and so long as compensation is perfect, little or no drug treatment is required.”

In aortic incompetence the same wise general rule of “little or no drug treatment previous to failure of compensation,” is laid down. When the left ventricle begins to fail and dilatation to replace hypertrophy, cardiac tonics and stimulants are to be cautiously given. Here arsenic has seemed in the early stages of the trouble the most useful drug both as a tonic and as relieving the heart pain, which is a common attendant of aortic incompetence. Digitalis when needed should be given in small doses, and intermitted as soon as its tonic effects are realized. The rules for the management of aortic stenosis are the same.

Chapter VI. on diseases of the myocardium, includes acute myocarditis, chronic myocarditis or fibroid degeneration, partial aneurism of the heart, hypertrophy and dilatation of the walls of the several chambers of the heart, atrophy, fatty infiltration, fatty degeneration, spontaneous rupture and tumors of the heart.

This group of subjects is ably treated, but without as far as we discover any extension of the field of knowledge. The pathological views closely correspond to those so ably presented by Dr. W. H. Welch, at the last meeting of the American Medical Association. The symptomatology remains obscure. No reference is made to the efforts of Rigal and Jubel-Renoy, in France, and L. M. Petrone, in Italy, to clear up this part of the subject and establish definite rules for the diagnosis of myocarditis.

Free use is made of Wickham Legg's admirable Bradshaw Lecture on Cardiac Aneurism (1883), a review of which appeared in the last number of this Journal, and the treatment of this subject is both more extended and more satisfactory than in most text-books on the heart.

“Idiopathic” hypertrophy of the heart scarcely receives the attention or space that it demands. We are told that its occurrence is doubted by some observers. The author holds the opinion drawn from the “clinical examination of living patients,” that such cases do actually occur. The condition, is, however, rarely seen on the *post-mortem* table, as it seldom causes death. The part played in the causation of so-called idiopathic cardiac hypertrophy by alcohol, and in particular by excessive potations of beer, as determined by Bollinger, and Schmidbauer, in Munich, does not appear to have attracted the author's attention. These observers attribute the great frequency of hypertrophy of the heart without valvular lesions or affection of the kidney, which occurs in Munich, to the exces-

sive habitual consumption of beer in that city. Hypertrophy is favored by the direct action of the alcohol upon the heart, by the enormous amount of fluid introduced into the body, and by the readily assimilated nutritive constituents of the beer itself. Furthermore, such habits are commonly associated with great bodily activity. The subjects of this form of hypertrophy, mostly men, and often of middle age, are always plethoric. The characteristic changes consist in the participation of both sides of the heart in the overgrowth, and in the enormous increase in the volume of the primitive muscular elements, with enlargement of the nuclei. Bollinger found in most of his cases no anatomical evidences of inflammation, nor of fatty degeneration. Death takes place after brief illness, with symptoms of cardiac failure, and must be looked upon in the absence of adequate anatomical lesions as due to paralysis of the cardiac nerves and ganglia.

Chapter VIII. treats of the cardiac neuroses, including palpitation, intermittent action, and angina pectoris.

The group of symptoms included under the term angina pectoris, are, in all probability, produced by a number of different causes. But the essential feature of angina pectoris is pain in the region of the heart. The cardiac pain often met with in young persons, rarely associated with structural changes in the heart or vascular apparatus, and seldom, if ever, fatal, may be called functional angina pectoris (pseudo-angina). This affection is in strong contrast to true or organic angina pectoris, which rarely occurs before the fortieth year, is often associated with coarse structural changes, very generally with minute degenerative changes in the heart and vessels, is frequently fatal, in which the pain is intense and often accompanied by a terrible sensation of impending death.

"This division into a serious and organic form, and a comparatively trivial and inorganic form, is of practical clinical utility, and may be safely adopted, provided that it is clearly understood that the two forms run one into the other, and that it is sometimes difficult or impossible to separate them at the bedside."

We observe nothing new in the treatment of angina pectoris, either during or between the attacks.

The concluding chapter is devoted to the consideration of the diseases of the thoracic aorta. Acute aortitis, atheroma and general dilatation, aneurism, and coarctation of the aortic arch are briefly discussed. The space given to aneurism appears to us meagre in comparison with the importance of the subject. This part of the book is very satisfactory. The remarks upon diagnosis are especially clear and full. In the management of thoracic aneurism the author enforces great moderation in food and drink, but does not regard the extremely restricted diet of Tufnell as necessary. Dr. Bramwell believes that the favorable influence of the potassium iodide is due chiefly to its action in reducing blood-pressure, and relieving tension within the sac, and partly by removing the endarteritis obliterans, which is often present, more especially in syphilitic cases, in the minute arteries which ramify in the walls of the sac, and supply it with nutrient fluid.

The administration of chloral hydrate in small doses (seven grains *ter die*) has seemed beneficial in some cases in which arterial tension has been distinctly increased. The method of treatment by galvano-puncture is explained at length.

The cardiograph is described in an appendix.

In conclusion, we commend this book as well arranged, clear, trustworthy, and up to date.

J. C. W.

ART. XXI.—*On Tumors of the Bladder, their Nature, Symptoms, and Surgical Treatment.* By SIR HENRY THOMPSON, F.R.C.S., M.B. Lond., Surgeon Extraordinary to H. M. the King of the Belgians, Professor of Surgery and Pathology to the Royal College of Surgeons. Consulting Surgeon to University College Hospital, etc. 8vo., pp. 111. Philadelphia: P. Blakiston, Son & Co., 1884.

THE object of this book is to place before the profession the subject of vesical growths, and the means devised and practised by its distinguished author for their relief. Outside of the direct domain of abdominal surgery no surgical proceeding has recently attracted more attention than the proposal of Sir Henry Thompson to freely resort to a digital examination of the bladder by means of a perineal section, whenever there is ground from the history or symptoms of the case to suspect the existence of a tumor, which may possibly be removable.

By several publications in various periodicals the measure has been urged by its author and his experience with it detailed, until it has become familiar to most surgeons, many of whom, as opportunity has offered, have begun to follow in the steps of this greatest living authority upon affections of the urinary organs, and to put in force his suggestions in their own practice.

In June last, Sir Henry Thompson delivered two lectures before the Royal College of Surgeons upon the subject, and of these lectures, somewhat enlarged and altered in form, the present volume consists. After commenting upon the obscurity which so often attends on some cases of bladder and kidney disease, the method of arriving at a probable diagnosis is pointed out with the author's usual perspicuity and decision. It is insisted upon, that in every case we should inquire into the frequency of micturition, whether there is pain connected with the act, and if so, what is its character and seat, whether blood has been seen in the urine, mixed or unmixed, at the beginning or end of the act of urination, and whether its presence is affected by exercise; the character of the stream passed; the character of the urine itself to the eye and as determined by microscopical and chemical tests; the presence of pain in any part which can be connected in any way with the urinary organs, of dropsy, or of the other complications indicating renal disease. The vast majority of cases will be made clear where a systematic and thorough examination is made upon these points, and in the order given, but Sir Henry Thompson points out that there are left some cases to which the clue is not found even where these details are carefully and accurately studied, and upon which even careful physical examination, by sounding the bladder, palpating the abdomen, and investigating the condition of the prostate and neck of the bladder through the rectum, sheds no light.

The existence of such cases and especially the lesson taught him by one in which the patient succumbed to the exhaustion occasioned by a small tumor, led Sir Henry Thompson to consider whether he could not explore the bladder during life. The particular case referred to was under his care for several years, and he even resorted to a supra-pubic incision, but was unable to detect anything, yet after death there was found a single pedunculated tumor, which could have been easily removed through an enlarged incision, and which by hemorrhage and prolonged irritation had caused the death of a man only thirty-eight years old, after all the agonizing suffering which attends these cases.

After much thought he was led to question whether with perfect flaccidity of the abdominal walls induced by complete anæsthesia, he could not reach the entire cystic surface with his finger inserted through a median incision into the membranous portion of the urethra. This conception he first put into practice in a case in which he suspected the presence of an impacted calculus. He found that he was perfectly able to explore the entire vesical cavity, and finding that what he had thought to be an impacted calculus was a pedunculated tumor with some phosphatic deposit covering it, he twisted it off by means of forceps, the patient making a good recovery, and continuing well up to the time of the delivery of these lectures. His early impression was that it would be necessary to incise the neck of the bladder, but experiment upon the dead body, and his experience in this first case convinced him that simple "external urethrotomy" would suffice. It is therefore this old "button hole" operation applied for a new purpose, namely exploration of the bladder, which makes up the new procedure.

The membranous urethra is opened in the usual way and a gorget-like director is insinuated along the groove of the staff until it reaches the bladder, and along this director the left index finger is gradually inserted into the same viscus. The surgeon rising from his seat then makes firm pressure upon the thoroughly relaxed abdominal walls, and by this pressure, with such alterations in the position of the finger as he is able to make, the whole mucous surface is successively brought into contact with the finger tip. With vivid pen the author of this book depicts the enthusiastic expectancy which waits upon the surgeon who thus seeks to lay bare the mystery of suffering which has perhaps persisted for many years. He likens the sensations to those experienced by the hunter who at last finds his game within reach, or the explorer who knows that he is on the verge of a discovery which will settle a question of centuries. Nor do we think he errs, for the honest-minded physician who recognizes the true character of his profession, and who sympathizes with the sorrows of those to whose sufferings he is permitted to minister, may well rejoice that not only is he adding to the facts of human science, but that he may be just about to accomplish that which will bring relief, and even life to his patient.

In many cases, however, the result of the exploration will be the finding of a state of things which admits of no remedy, yet it is pleasant to know that, even when nothing can be accomplished in the way of cure, the mystery is solved, and the thorough drainage of the bladder effected by the operation is almost always attended with great relief to the sufferings of the patient, who may for a long time have been obliged to resort to the use of a catheter every two hours or oftener, and have hardly known undisturbed sleep for more than an hour at a time for months. After the exploration has been accomplished, and whether any further operation has been done or not, Sir Henry Thompson recommends that a soft rubber tube just projecting into the bladder should be left in the wound and allowed to remain for a longer or shorter period, to secure complete rest for the much tried bladder.

Sir Henry next gives the results of forty-three cases in which he has opened the bladder in the manner described and submits the results to an analysis. In twenty cases a tumor was found, and these cases are treated of separately in a subsequent chapter, but experience has shown Sir Henry Thompson that in addition to those cases in which the membranous urethra is opened, with the object of exploring the bladder, there are four conditions in which it may be most advantageously resorted to as an

alleviating and remedial measure. First it has been attended with benefit in those cases not unfrequently seen in which severe chronic cystitis has existed for a long period without material cause, such as stone, stricture, etc. The second class includes those cases of prostatic hypertrophy and atony of the bladder, in which frequent catheterization is requisite, and yet in which that proceeding is a cause of continued irritation, and the patient is nearly worn out by his sufferings. The third class consists of those cases in which an impacted calculus, or adherent calculous matter are suspected, or revealed by sounding. The fourth category consists of cases in which there is painful micturition or bleeding without other evidence of pathological change. No less than six such cases have occurred in Sir Henry Thompson's practice, and he accounts for them upon the theory that there has been a former attack of cystitis, and a habit of frequent micturition has been acquired which the patient finds it impossible to overcome. Regarding the operation as involving but little risk to life our author has used it as a last resort in these cases, and always with more or less relief, which he attributes to the entire rest of a week or more secured to the bladder by the operation.

In Chapter III. our author goes into a succinct account of the history of bladder tumors, in the records of surgery, in museum specimens, and in his own experience. Several wood-cuts representing morbid growths are given, and six colored lithographs representing the microscopical appearances of specimens coming under his own observation. The lithographs are very satisfactory and exhibit the appearance presented under the microscope with rather diagrammatic distinctness. We shall not attempt to follow our author in the details contained in this chapter. Suffice it to say that it gives a good summary of the history of cystic growths, and furnishes, with all the minuteness required by the general surgeon, the present state of our knowledge concerning the pathology of these very troublesome and serious cases.

Chapter IV. is occupied with the treatment of tumors of the bladder. Sir Henry Thompson has little confidence in the administration of astringents internally, being convinced that the rest in a recumbent position with which their exhibition is always combined, has quite as much to do with stopping the hemorrhage as the astringents themselves. He places much more reliance upon the injection of astringents into the bladder through a soft catheter. He has had considerable success with perchloride of iron and nitrate of silver in several cases in which it was impossible to do more than partially remove existing growths by operation. His experience has been that with these agents, especially the iron, it is quite practicable to control or at least materially modify the hemorrhage. He uses the iron of the strength of from 20 to 60 minims of the tincture to 4 ounces of cold water, and 1 to 6 grains of nitrate of silver in the same amount of water.

Sir Henry Thompson is emphatically of the opinion that when the trouble, either by the general symptoms or by actual exploration, is known to be of a malignant character, it is not only useless but injurious to attempt the removal of a growth, though he is convinced, as we have before had occasion to say, that the exploration, by providing direct drainage, and securing rest to the bladder, will alleviate suffering and prolong life.

Considerable space is given to the course to be pursued by the surgeon when he has opened the membranous urethra and insinuated his finger

into the bladder. He is advised to take plenty of time to thoroughly examine the entire interior of the viscus and to carefully ascertain, with the aid of the right hand pressing down the abdominal walls, the consistency, shape, and location of the tumor, should one be present. Upon the care and accuracy with which this examination is made must depend the wisdom of the operator's conclusion, and the facility and success which will attend his further steps to attempt the removal of the growth. He should consider among other things whether there will be a better prospect of success by a supra-pubic opening, with which the incision already made need not in the least interfere. In a general way it may be said that if the tumor is polypoid it admits of removal either in whole or in part, if the integrity of the vesical coats will not be too much imperiled, but if the substance of the growth is hard and without marked prominences, nothing should be done further than to remove a fragment for microscopical inspection.

The proposal to remove bladder growths through a simple perineal section, the *boutonnière* operation, has been challenged by Professor Guyon, of Paris, who maintains that the supra-pubic operation should always be resorted to, but Sir Henry Thompson ably argues that in very many cases the first and much less serious procedure is amply sufficient; that it has the great advantage of permitting a thorough exploration of the bladder; that, as in fully one-half the cases a successful removal of the growth is impossible, it is most important to obtain this knowledge by a step involving as little risk to life as possible; and finally, that his experience sustains him in the opinion that the urethral incision permits of the successful removal of polypoid growths without danger, while it does not prevent but highly favors the prospect of success, should it be deemed expedient to open the bladder from above. Our author next describes and figures the various forceps and other instruments he has contrived, and gives detailed directions for their use, with many hints and cautions, the fruits of his own experience. We cannot follow him through these minutiae, nor is it necessary, as we take it for granted that no one will be likely to resort to the operation without first making himself familiar with what Sir Henry Thompson has written upon the subject.

But the true test of any operation is the result which may be looked for to follow its adoption, and Sir Henry Thompson devotes the last ten pages of his monograph to an analysis of the results which he has obtained. We shall best aid the readers of the *AMERICAN JOURNAL* to occupy a judicial position as regards this procedure by giving a brief summary of the same analysis. The total number of cases in which an exploratory operation revealed the presence of a tumor was twenty. Two of the number were women, one of whom died in three days with suppression of urine, dependent, as the autopsy showed, upon advanced disease of the kidneys; the other made a good recovery, and at the time of writing was practically cured. Of the eighteen male cases, five died within three weeks, three within some months, but in two of the last the fatal ending was dependent upon the development of malignant disease elsewhere. Nine cases were living when the book went to press. In one of these a tumor was removed in the fall of 1882, and a similar growth was successfully removed in February, 1884. In four cases it was only deemed expedient to attempt the removal of part of the growth, and all four were benefited by the partial proceeding. Of the remaining four, one has had no return in four years; a second had slight symptoms of a return after

fifteen months, but is able to work hard; a third is actively employed, but shows a tendency to bleed after exercise, a year having elapsed since the operation; the fourth was greatly improved and able to resume his active life.

It will thus be seen that the prospect of a complete and thorough recovery is not very large, yet the results should be regarded as eminently satisfactory in view of the fact justly insisted upon by Professor Thompson, that unassisted by operation, death with protracted suffering is certainly inevitable in every one of these cases. The proposer of the operation reasonably hopes that he may have more success with his next twenty cases from the experience he has gained in his first series. Already it is evident that by adopting this operation we may save life in a few instances, and prolong it with comparative comfort in some others. Another result can also be claimed for this operation, which, though of more interest to the surgeon than to his patients, is not to be despised, viz., the opportunity it furnishes for adding to our knowledge of the pathology of bladder tumors.

The details of a few cases are given, and the volume concludes with an elaborate table of the twenty cases of tumors which have fallen under the observation of Sir Henry Thompson since he first conceived and put in practice this exploratory operation. A noticeable feature of this table is the appending to each case of a diagram intended to show the shape and location of the tumor as revealed to the finger of the operator.

It remains for us but to commend the book and the subject of which it treats to the attention of the profession, and to reiterate our impression of its great importance. Nor can we conclude without congratulating Sir Henry Thompson upon his having made another valuable contribution to the resources of our science and art.

S. A.

ART. XXII.—*Insanity Considered in its Medico-Legal Relations.* By T. R. BUCKHAM, A.M., M.D. 8vo., pp. 265. Philadelphia: J. B. Lippincott & Co., 1883.

THE important subject discussed in this treatise has, we think, been very ably and satisfactorily handled by the author. The acknowledged uncertainty of verdicts in insanity trials, together with the general feeling of distrust in relation to judicial decisions in such cases, is a source of the profoundest solicitude to all parties interested; and any new light that may serve to dispel the cloudiness that too often environs the medico-legal relations of insanity will be cordially welcomed by the legal physician.

This painful uncertainty as to the result of insanity trials has not escaped the animadversion of distinguished authorities. According to one, in a capital trial, where insanity is alleged, "the acquittal or conviction of the prisoner is a *matter of chance*; the issue could hardly be more uncertain if it were to be decided by the tossing up of a shilling than by the grave procedure of a trial in court." Says another high authority: "Acquittal on the plea of insanity is, on some occasions, a *mere matter of accident*." Dr. Buckham very properly stigmatizes such a travesty

of justice as shocking. "Guilty persons acquitted, and innocent persons hanged in the sacred name of justice, after an intended impartial legal trial!"

Doubtless, the reasons for this "uncertainty" are to be ascribed to a want of correct appreciation of the true nature of insanity, or, as the author expresses it, because "the real premises are imperfectly understood." Neither the psychological definitions of insanity, nor the numerous judicial decisions rendered have helped to remove it; on the contrary, they have but served—especially the latter, by their extraordinary contradiction to one another—to increase the difficulty of arriving at a satisfactory conclusion. What, for example, *can* we conclude, when one eminent judge affirms what another equally eminent denies? One authority asserts that insanity must be absolute; another, that partial insanity is sufficient. One, that an insane person must be punished as a warning to others; another, that punishing an insane person is extremely cruel and inhumane. One affirms that insanity must be proved beyond a doubt; another, that preponderance of proof of insanity is sufficient. One declares that the onus of proof of insanity rests with the defence; another, that it is on the state. According to one, medical opinions and theories in insanity cases are vicious; whilst in the judgment of another, medical experts know all that is known on the subject. One affirms that expert testimony is of high value; another, that it is worse than valueless; and last, but not least, that *there are no legal tests for insanity*.

The author proceeds to discuss the different theories of insanity, referring especially to the three mentioned by Wharton and Stillé, as the "somatic or materialistic," the "psychical or metaphysical," and the "intermediate." The first of these—the *somatic* theory—denies the existence of the mind as a separate and distinct entity, but asserts that it is a product or function of the brain. The second theory—the *metaphysical*—affirms that the mind is a distinct entity, and not dependent upon the body for its existence. The third, or *intermediate* theory, was first proposed by Messrs. Wharton and Stillé, and is an attempt to supply the acknowledged defects, and to reconcile the admitted inconsistencies of the two former hypotheses. "This view," according to its authors, "attributes to the body and soul alike, originative influence in the growth of mental diseases."

Our space will permit us but a glance at a few points in the different "theories." The grand difficulty with the "somatic" theory is, that the regarding the mind as a function of the brain, in the words of the author, "necessarily precludes the possibility of an independent will;" and it must further lead logically "to the doctrine of absolute irresponsibility." Dr. Maudsley, the most distinguished advocate of this theory, tells us that man has no free will, no ability to "steer himself or determine his course;" that "his destiny is made for him by his ancestors, and that no one can elude, were he able to attempt it, *the tyranny of his organization*;" and that "he is brought like an automaton." Now certainly, if all this be true, then man's responsibility ceases. If he is not free to choose the good and reject the evil, but if this choice is predetermined for him by "hereditary transmission of character, then the irresistible force or 'destiny' is responsible for his course, and not the individual himself."

Dr. Buckham argues very forcibly and satisfactorily against this specious doctrine, and whilst he freely admits the well-known influence of heredity in determining the development of the physical and mental, and

to a certain extent even the moral qualities of the individual, he very properly objects to the *extreme* views held by the "somatic" school, which seems entirely to deny and ignore the corrective influence and power of subsequent education and association. We think there can be little doubt, if extended and accurate tabular results could be procured of the proper training of the cast-off children of poverty and crime, who have been subsequently properly cared for, and surrounded with wholesome influences, that such results would prove that a large proportion of these children of an evil "destiny" had succeeded in "eluding the tyranny of their organization," and were rejoicing in their freedom from this "hereditary transmission of character."

The "metaphysical or psychical theory" need not be specially alluded to here. The author adopts it partially; that is, he considers the mind to be a distinct entity, separate from the body, but "that in this life the mind is wholly dependent for the manifestation of its operations on certain organs of the body, which we designate *physical media*." In other words, that in our present state of existence, the mind can only act through the medium of its appropriate organ, the sensorium. This idea, or doctrine, the author formulates under the title of his "Physical Media Theory," which seems to be a sufficiently good name to bestow upon what many psychologists have long held to be the true exposition of the case. He most correctly asserts that "the expert, the medical jurist, and the law have to deal with the mind *only when connected with the body*; the *individual* comprising both the mind and the body. It will not be alleged that the mind, *unless associated with the body*, can make a will, or commit a crime of which human laws can take cognizance, nor can the body without the mind."

Following out this line of reasoning, we must admit that the mind can appreciate external objects only through the sensations, *i. e.*, impressions received through vibrations of distinct nerve-fibres; and as the elements of our experience are dependent upon sensations, it further results that if the organs of transmission be not in a healthy state, the impressions received must necessarily be abnormal. And by parity of reasoning, the mind's *manifestations* will be abnormal, or disordered, if the *media* through which these manifestations take place are disordered. And this admission brings us to the last link of the chain of reasoning, namely, that *insanity* (which is a display of some of the disordered mental manifestations), is to be regarded not as a disease of *the mind*, but as a disease of *the physical media*, through which the mind operates.

This view of the nature of insanity we hold to be physiologically and psychologically correct: that it is not, properly speaking, a disease of the mind, but of the brain; and that the distorted, deranged mental manifestations are the result of the diseased *media*, through which the mind is forced to act, just as pure white light takes the hue and complexion of the medium through which it is transmitted. Nor do we think that this view is a mere hypothesis, unsupported by abundant proofs. The author sustains his theory by an appeal to unanswerable facts, one of the strongest of which is the therapeutic treatment of the insane by means of *material* remedies. It is not conceivable that the *mind* can be affected directly by *medicines*. "The idea of curing a diseased incorporeal, intangible entity by the use of material remedies is so utterly absurd that it is difficult to suppose a sane man who entertains it." But on the theory of diseased *media*, the therapeutic treatment is perfectly rational.

Pathological facts lead us to the same conclusion. It is well known that injuries to the brain frequently lead to mental derangement, impairing sometimes one faculty, sometimes several. The same result notoriously follows diseases of the brain, as in inflammation of this organ or of its meninges, in embolism of its arteries, cutting off a due supply of nutrition, in tumors, abscesses, and numerous other diseased conditions. In any or all of these diseases, if the material cause affecting the *physical media* be removed, the mental manifestations will recover their normal condition, or, in other words, the insanity is cured. Moreover, it does not follow that because we cannot always discern the *physical causes* of mental disorder, these do not exist, inasmuch as they may be so subtle and recondite as to elude our observation.

Another strong argument in favor of the theory we are advocating is derived from the effect of certain narcotic medicines upon the brain, producing, at will, a series of mental disturbances, varying from "maudlin imbecility or hallucinations, to boisterous maniacal ravings, and the wildest delirium—the complete subordination of reason and judgment; and not only can these mental phenomena be produced at will, and continued at pleasure, by the exhibition of one or more of the deliriants, but the abnormal mental manifestations may also be controlled at will *by the administration of the antidote to the drug used*; while long-continued habitual use of deliriants invariably results in the impairment of the mental faculties."

There remains a still further, and we think unanswerable, proof of this theory, viz., that afforded by the anatomical lesions of the brain in cases of insanity. Modern research has established this beyond peradventure. By the aid of the microscope and chemistry we have been enabled not only to verify the direct connection of insanity with disease of the brain, but, in numerous instances, to trace the different forms of insanity to abnormal conditions of different nerve centres. That this cannot yet be done in *every* case of mental derangement is surely no argument against the position taken, inasmuch as we are, so to speak, only on the threshold of research in this most interesting field, which is now being so successfully cultivated by patient and indefatigable workers.

The chapter on "Experts in Insanity" is very full, and carefully written, but we have room for only a very scanty analysis of its contents. The author very justly takes exceptions to the employment of mere general practitioners as such experts, restricting the latter exclusively to such physicians as have made a *special* study of insanity, and preferably to "superintendents and first assistants of State Institutions for the Insane." He also inveighs very properly against the almost universal neglect of the study of medical jurisprudence, including, of course, insanity, by the medical colleges of this country, and declares that by "experts" alone—true experts—and not by the courts, should the question of the insanity of the prisoner be determined. He very justly condemns the vicious practice of conducting such trials by presenting *hypothetical cases* to the expert, instead of allowing him the opportunity to personally examine the alleged lunatic, and thus form a rational diagnosis of his case. He elaborates an excellent practical scheme for improving our present faulty system of expert testimony in cases of insanity, which contain suggestions well worthy of consideration by jurists and legislators. He concludes with an "Appendix of Judges' Opinions," in which is presented a truly formidable array of legal deci-

sions of the most startling contradictory characters, delivered by judges of equal eminence both in Great Britain and in this country. It is almost painful, and certainly humiliating, to read over this exhibit of contradictory judicial rulings on the various points connected with insanity in criminal trials. Talk about the disagreement of doctors! why, it hardly amounts to a tithe of what is here shown to exist in the legal profession.

The book is very handsomely printed, and is provided with a copious index. We can heartily recommend it as worthy of perusal by members of both the professions of medicine and law.

J. J. R.

ART. XXIII.—*Osteotomy and Osteoclasis for Deformities of the Lower Extremities.* By CHARLES T. POORE, M.D., Surgeon to St. Mary's Free Hospital for Children, New York; Member of the New York Surgical Society, etc. 8vo. pp. 183. New York: D. Appleton & Co., 1884.

UNDER the above title the author has presented a very valuable treatise upon a subject which has during the last few years excited much attention in the surgical profession both abroad and in this country.

Dr. Poore first considered the causes which produce the deformities for which osteotomy and osteoclasis may be required, and holds with many other high authorities that the cases are generally, with the exception of a few due to coxalgia, the result of rachitis; and states very distinctly that he is not a believer in the spontaneous cure of bending of the bones, and enters his protest against the advice which is frequently given to parents, even by members of the medical profession, not to submit such cases to treatment, as they will outgrow the malposition.

The subject of osteotomy in general is next considered, and there is given a clear and condensed *résumé* of the various operations and their modifications down to the present time, and there is added a description of the instruments used in the performance of this operation.

The two methods of osteotomy, the linear, which he considers practically a subcutaneous operation, and the cuneiform, which is performed through an open wound, are described and compared, and the author expresses his preference for the former as being attended with much less risk, and equally favorable results in the vast majority of cases.

Osteotomy for deformities of the hip-joint receives a very extended notice, and among the causes producing these deformities he mentions hip-joint disease, rheumatism, unreduced dislocation, and fracture united at an angle.

For the correction of deformities at the hip-joint following suppurative coxalgia, he unhesitatingly recommends osteotomy in preference to forcible straightening, and instances examples of the most unfortunate results which have attended the latter procedure.

The first osteotomy for deformity, which was performed by Dr. J. Rhea Barton in 1826, an ankylosis of the hip at a right angle, consequent upon inflammation of that articulation, is mentioned, and Dr. Poore then gives

a very interesting account of the operations devised by various surgeons from that time to the present, and expresses his decided preference for the procedure which is known as Gant's modification of Adams's operation, in which the section of the femur is made below the lesser trochanter, as by all means the best operation in cases of deformity due to hip-joint disease.

Mr. Adams's operation, that is, section of the neck of the femur, he considers a good operation when the bone is in a healthy condition, to correct such a deformity for instance as might arise from acute traumatic inflammation of the hip-joint. In his preference for subtrochanteric osteotomy to that of the neck or to the intertrochanteric section of the femur, in cases of deformity resulting from coxalgia, the present writer most heartily concurs, as may be seen by reference to a paper upon this subject published in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES for July, 1883, page 101. The mortality for 167 cases of osteotomy at the hip collected by Dr. Poore is given at 10.18 per cent.; this includes 35 cases of cuneiform section, 68 cases of section through the neck of the bone, and 64 cases of section below the trochanters. This high rate of mortality is explained upon the ground of imperfect knowledge as to the steps of the operation and the selection of proper cases, as instanced by the greater number of fatal cases in the early history of the operation.

We confess that we were much surprised to find so high a mortality following this operation, for our experience of the cases in which it has been performed in this city, and we have cognizance of some twenty cases not one of which terminated fatally, would lead us to consider it one of the safest of surgical procedures.

In this operation Dr. Poore uses the osteotome or chisel in preference to the saw devised by Mr. Adams, thinking that the former makes a cleaner wound, and one which heals more readily; in this respect he agrees with the late Mr. Maunder, but here also we must confess that we have been abundantly satisfied with the results following the use of the saw, and consider it a most satisfactory instrument.

The accidents recurring after this operation have been few; among these may be mentioned excessive suppuration, occasionally hemorrhage, in one case, which ended in recovery after ligation of the femoral artery; gangrene, which terminated fatally, from the great vessels being caught over the upper fragment of the bone, and division of the great sciatic nerve during an intertrochanteric section.

The subject of *genu valgum* is considered very fully, the author believing in the now universally adopted osseous theory of its production. He describes three varieties of *genu valgum*, a femoral form in which the deformity is due to changes in the relation of the condyles of this bone; a tibial form, in which the malposition of the leg is due to changes in the plane of the tibial heads, and a tibial form in which the articular ends of both bones may be so altered that both contribute to produce the deformity. He attributes the greater number of deformities to the femoral form in which there is hypertrophy of the internal condyle of the femur.

The various operations devised for the relief of this deformity are fully described, and the unsatisfactory results of mechanical treatment alone are pointed out; the author very strongly advocates the operation of MacEwen, that is, a transverse section of the shaft of the femur through a small wound from the inner side a short distance above the epiphyseal line of that bone.

The vast number of cases operated upon by Macewen with very satisfactory results in removing the deformity, and with an almost insignificant mortality, fully justifies the favorable opinion expressed by Dr. Poore; and a limited number of cases of this operation, which have come under our observation, incline us to hold the same opinion.

Osteotomy for Genu Varum and Tibial Curves is also fully described and illustrated by appropriate cases; here also some personal experience induces us to accept the views of the author as to the general safety and remarkably successful results of this operation in properly selected instances.

The after-treatment of cases which have been subjected to the operation of osteotomy is laid down in a most clear manner; the small wound through which the bone has been divided is first closed by a narrow strip of adhesive plaster and a compress covered with iodoform is next applied; the limb is then put up in plaster-of-Paris dressing, which gives very firm fixation to the parts; on the third or fourth day a trap is cut opposite the wound, or sooner, if there be a rise of temperature, and the wound can be dressed through this if any suppuration has occurred, but the wounds are more often found perfectly healed at their first exposure. In cases of osteotomy of the upper portion of the femur the wound is treated in the same manner, but a splint and extension apparatus are applied instead of the plaster-of-Paris dressing.

Osteoclasis, both manual and instrumental, are fully described, and the variety of cases suitable for their application are pointed out, as well as some of the instruments which have proved most useful for this purpose.

The Redressement brusque of Guérin and Delore is also described in its relation to the correction of deformities of the lower extremity; and the author points out the preference of the French school of surgeons for osteoclasis in some of its forms to osteotomy, which finds more advocates among the English and German surgeons.

On the whole, the author expresses himself well satisfied with the operation of osteoclasis as being an operation attended by little risk, and one which is, in suitable cases, followed by most satisfactory results; he has made use of this procedure in 34 limbs with success as regards the correction of the deformity and without any untoward consequence. In cases not suitable for osteoclasis he recommends linear or cuneiform osteotomy, preferring the former when practicable as the safer operation; this is well shown by the following statistics: 1448 linear osteotomies gave a mortality of 0.01 per cent., while 62 cuneiform osteotomies gave a mortality of 0.96 per cent.

Dr. Poore has had quite a large personal experience with the various operations for the correction of deformities of the bones, and has embodied the results of that experience in this very practical and interesting treatise, which, we doubt not, will be well received and studied with profit by the medical profession.

H. R. W.

ART. XXIV.—*Recent Works on Albuminuria and the Testing of Urine.*

1. *On the Various Modes of Testing for Albumen and Sugar in the Urine.* Two lectures by GEORGE JOHNSON, M.D. London, 1884.
2. *On Bedside Urine Testing, including Quantitative Albumen and Sugar.* By GEORGE OLIVER, M.D., 2d ed. London, 1884.
3. *Discussion on Albuminuria, its Pathology and Clinical Significance, before the Glasgow Pathological and Clinical Society.* Reprinted from the *Glasgow Medical Journal*. Glasgow, 1884.

It may be said without exaggeration, that whatever is worth knowing about albuminuria is contained in the three small volumes above named. It is true that the reader who has perused them all may be in some uncertainty in view of the large number of facts which are there brought to his notice, as to exactly what ought to be remembered. Only a few years ago it would have been thought scarcely possible that so much new information could have been gathered upon this important subject, in connection with the tests for it, the mechanism of its production, and its bearing upon health and disease. Unfortunately, as is so often the case, when a mass of new facts are adduced upon a given subject, there are some discrepancies in the results of different observers, which time and further experience must reconcile.

Dr. Johnson's admirable little book is practically an appeal for picric acid for the first place, not only as an albumen test, but also as a delicate test for sugar, although other methods of testing for albumen and sugar are also considered. He demonstrates the usual fallacies and defects of the heat and nitric acid tests, and calls attention to a source of error which is not commonly appreciated. It is the practice of adding acetic acid to the urine before boiling, as the result of which an acetate of albumen is formed, which, like the nitrate of albumen, is not coagulable by heat. The albumen, therefore, remains in solution, and is not detected. This statement of Dr. Johnson is confirmed by our own experience.

Dr. Johnson very properly insists that the smallest amount of albumen detectable, whether accompanied or not by the presence of tube-casts, is abnormal. For its detection, into a test-tube six inches long, he pours a four-inch column of urine; then holding the tube in a slanting position, he gently pours an inch of the saturated picric acid solution on the surface of the former, where, in consequence of its low specific gravity (1005), it mixes only with the upper layer of the urine. As far as the yellow color of the picric acid solution extends, the coagulated albumen renders the liquid turbid, contrasting with the transparent unstained urine below. There must be an actual mixture, and not merely a surface contact of the two liquids. When, in consequence of the scantiness, the turbidity is slight, the application of heat to the upper part of the turbid column increases the turbidity. If the tube be then placed aside, in the course of an hour a delicate horizontal film will have formed at the junction of the colored and unstained strata of urine.

Another method recommended by Dr. Johnson, is to add about one-third of a grain of powdered picric acid, or as much as can be carried on the point of a penknife, to about a drachm of urine in a test-tube. As the picric acid dissolves, the urine becomes turbid in proportion to the amount of albumen.

The albuminous opalescence, which always *occurs immediately* if at all, and is increased by heat, may easily be distinguished from the coarse granular particles of urate of sodium, which sometimes result from the acidity of the picric solution, since they are readily dissipated by heat. If left alone they also fall quickly to the bottom, carrying with them so much of the picric coloring matter, that when placed under the microscope they are so opaque as to appear almost black.

In like manner, peptones, quinine, and the other vegetable alkaloids, which are precipitated by picric acid, are redissolved on the application of heat. In fact, says Dr. Johnson, "there is no known substance occurring in either normal or abnormal urine, except albumen, which gives a precipitate with picric acid insoluble by the subsequent application of heat." Further, out of some hundreds of specimens of urine he has tested for peptones, he has found them in only one specimen, which was sent to him by Dr. Oliver.

Dr. Johnson believes, too, that picric acid is a much more delicate test for peptones than Fehling's copper solution, which has been chiefly relied on.¹

While peptones and urates are redissolved by applying heat, both are redeposited on cooling, when the urates are revealed by the microscope to be composed of large granules of sodium urate and uric acid crystals, while the peptones appear as exceedingly minute granules, which exhibit the Brownian movement. If peptones are associated with albumen in the same specimen, their detection and separation may be readily effected by the picric acid and heat tests. The precipitate with picric acid, instead of being increased and rendered dense by heat, as when albumen alone is present, will be lessened in proportion to the peptones present. If the boiling liquid be then poured on a filter, the dissolved picrate of peptones will pass through and precipitate again on cooling, while the coagulated albumen remains on the filter.

Dr. Johnson considers the addition of citric acid to the picric solution, as suggested by Dr. Oliver, unnecessary. This may be so, but it is nevertheless true, as Dr. Oliver says, that the picric cum citric solution is more delicate than the picric alone. That is, in testing very small albuminurias, we have found the picric acid solution to which citric acid has been added in the proportion of two drachms to the ounce of the former to produce a broader and more distinct line when used by the contact method than does the pure picric acid solution. At the same time, while the urine experimented with was one which, although it contained numerous hyaline tube-casts, did not respond to the heat and pure acid tests, the line produced by the picric solution was as distinct as any one could desire. Another advantage, also, of the mixed picric and citric solution is the fact that it is heavier than any urines likely to be met with; and, therefore, may be placed first in the test-tube and overlaid with urine; while the pure picric acid solution, which has a specific gravity of 1005, is lighter than most urines, and must, therefore, be poured on the urine. Again, a urine may be so light as to be of the same specific gravity as the picric solution, when it is impossible to overlay at all, the two fluids mixing immediately. This is by no means unimportant, because it seems to be conceded by all observers that the "contact method" is that which in-

¹ If urine is gently poured on the surface of some Fehling's solution previously introduced into a test-tube, a *rose-red* color appears at the junction of the two liquids if peptones are present.

sures the greatest delicacy with all the so-called delicate tests, and without which most of them can scarcely be called delicate.

Dr. Oliver's little book, which reached a second edition within a twelve month after it first occurred to him to facilitate urinary examination at the bedside by means of test-papers, is ostensibly devoted to this subject, but contains much valuable information quite independent of it, including quantitative methods for albumen and sugar, also by means of test-papers.

In Dr. Oliver's experience with the delicate tests he found the potassio-mercuric iodide, sodium tungstate, the picric cum citric and the picric acids the readiest; and he would, if asked for a preference, decide in favor of the first. He found the nitric acid, acidulated brine of Dr. Roberts, and potassium ferrocyanide, much slower in bringing to light mere traces of albumen. In the form of a test-paper, Dr. Oliver found the picric acid "the weakest of the series." In reply to this, Dr. Johnson says the small slips of paper dried after immersion in a saturated solution, do not retain sufficient to render them a satisfactory means of testing. But the ferro-cyanide of potassium, although much less delicate than the others mentioned, is the only one of the series besides heat and nitric acid which does not throw down peptones. For previous acidulation of the urine, Dr. Oliver invariably uses citric acid, which in the case of the potassio-mercuric iodide and potassium ferrocyanide is placed in a separate test-paper, which may be attached by a thin layer of rubber to the paper containing the reagent. This may be done in the case of the picric acid and sodium tungstate, although with them chemical reasons do not necessitate the separation of the citric acid from the reagent, and the two are, therefore, united in the same paper.

It is to be remembered that all of these tests may produce an opacity by the precipitation of acid amorphous urates, that all except the sodium tungstate and ferrocyanide of potassium precipitate the vegetable alkaloids, and all but the ferrocyanide throw down peptones; but the opacity thus produced is promptly dissipated by moderate heat. The oleo-resins, as balsam of copaiba, are precipitated by citric and picric acids, but disappear on boiling to quickly reappear, even before the urine is quite cooled. The others of the series do not precipitate the oleo-resins, in the absence of citric acid.

Mucus is promptly precipitated by citric acid, and if this is added first, as directed by Dr. Oliver, the pressure of mucus is revealed at the onset, and it may be filtered out. The mucus thus precipitated is insoluble by heat, and is thus distinguished from urates. Heat, on the other hand, intensifies, the albumen precipitates. Dr. Kirk in his paper before the Glasgow Medical Society also suggests the use of citric acid to remove mucus.

With regard to quantitative testing for albumen, while, as far as we know, Dr. Oliver's method is the shortest and simplest yet suggested, we think it still too troublesome to be much availed of by the practising physician, and quite agree with Dr. Johnson, that for practical purposes it is sufficient to use the term "opalescence" for the slightest degree of coagulation, "miliness" for a greater degree of turbidity, and to indicate still larger amounts by fractions showing the proportion of the bulk of albumen, after subsidence, to the whole column of fluid tested, as $\frac{1}{2}$, $\frac{1}{4}$, etc. The latter mode of measurement may be carried to a considerable degree of

refinement by using suitably graduated test-tubes. Under these circumstances, at least six hours should be allowed for subsidence.

The discussion on Albuminuria before the Glasgow Pathological and Clinical Society is a 12mo. volume of 164 pages, made up of excellent papers, not, of course, unconflicting, or without error, but reflecting, every one, a high degree of intelligence, and a thorough acquaintance with urinary pathology. It is of course impossible for us to give even an outline of the views expressed by the different speakers, who included Dr. Roberts, of Manchester, Profs. Gardner, Greenfield, McCall Anderson, Hamilton, Cleland, Leishman, and Drs. David Newman, J. Mortimer Granville, Mahomed, Finlayson, Coats, McGregor-Robertson, Kirk, Perry, Middleton, and Steven; while papers by Drs. George Oliver and Francis Henderson were held as read in their absence, and published. It is but right to say, that some of the strongest papers were read by men whose names are least known.

We were somewhat surprised to find Drs. Newman and Middleton adopting the view originally suggested by von Wittich,¹ according to which the urine is formed in the first place by a filtration into the Malpighian capsule of the serum of the blood, including the albumen, and that the act is completed by the reabsorption of the albumen by the cells of the convoluted portions of the uriniferous tubules. This view we first met fully developed in the *Manual of Physiology*, by Küss, of which a translation by Dr. Amory, of Boston, was published in this country in 1875. The strongest argument in favor of it is the very satisfactory manner in which it explains the existence of the so-called normal or physiological albuminuria, but as we agree with Dr. Johnson and others, that no albuminuria can be physiological, although there may be an albuminuria which is of comparatively small significance, this prop of the von Wittich's theory is removed.

The most important point in Dr. Roberts's paper is the conclusion to which he has come, that the heat test remains in his hands the most delicate. But it appears to us, as to Dr. McCall Anderson, the president, that Dr. Kirk has thoroughly vindicated the delicacy of the picric acid test when used in the "contact method" as suggested by Dr. Johnson, and we can say also with Dr. Anderson, that "we know no more beautiful or more delicate test for albumen than the picric acid solution."

Both Dr. Johnson's and Dr. Oliver's books include sugar testing. The former gives the preference over all other tests to picric acid, for quantitative and qualitative testing. Being more delicate than Moore's test, the fermentation test, and Trommer's test, it is at least as delicate as Fehling's cupric fluid and Pavy's ammonio-cupric method, while it requires less manipulative skill, is more rapidly completed, and is not affected by albumen, uric acid, or other ingredient of the urine.

We must refer the reader to Dr. Johnson's own book for the details of the quantitative method by picric acid, but subjoin the method by which he tests every specimen of urine qualitatively, first for albumen, and then for sugar. To about a drachm of urine, add its own volume of saturated picric acid solution. If the liquid remains clear, no albumen is present. If a precipitate occurs, not dissolved by boiling, there is albumen in proportion to the amount of precipitate. Now add half a drachm of liquor potassæ, and boil for a few seconds; the coagulated albumen if present, is

¹ Ueber Harnsecretion und Albuminurie, Virchow's Archiv, Bd. x., s. 325, 1856.

dissolved by the alkali, and a red-black coloration occurs. If, when an ordinary half inch test-tube is held up to the light, a red color is visible through the liquid, there is no more than the normal amount of saccharine matter—less than a grain to the ounce. As little as two grains to the ounce will render the liquid inky-black, so that no light is transmitted through the tube.

Dr. Johnson believes, with many others, that there is a trace of glucose or some allied substance in normal urine, which gives a reaction alike with picric acid and Fehling's solution. He finds the results with the two tests remarkably uniform, that with picric acid indicating a little less, .5 to .7 of a grain to the ounce, and Fehling's solution, .7 to .9 of a grain. We think there is reason to believe that such reaction with Fehling in normal urine is due to uric acid, and possibly in part to kreatinin; and that when these substances are carefully removed, no reaction occurs with Fehling. Dr. Johnson is sustained in his position that uric acid does not react with picric acid, by the results of Dr. Oliver's experiments; but the latter has found that both kreatin and kreatinin reduce the alkaline picric solution by the aid of heat. As the daily secretion of kreatinin in the urine is 11.5 grains, according to Thudicum, and 9 to 20 grains according to Neubauer, it is not at all unlikely that the reaction found by Dr. Johnson between normal urine and picric acid may be due to this substance.

Dr. Oliver's test for sugar is the intensely blue, indigo carmine, or the sulph-indigotate of sodium, in the shape of a test-paper, since the test is not available in the aqueous form.

The effect of glucose upon the indigo-carmin is, in the presence of heat, to decolorize it, producing in the course of such decolorization a characteristic play of colors, which may even be availed of for the quantitative estimation of sugar. One, or at most two drops of diabetic urine introduced into a solution made by covering one of the test-papers with water, and gently heating it, will cause, within a minute after the first simmer, a beautiful violet tint to spread throughout the bright-blue solution; very quickly, the violet deepens and passes into purple; this, in its turn, melts into reddish-purple, which gives place to various tints of red, orange, and finally a straw-color, which remains without further change however long the fluid is heated. Now, on shaking the tube, the colors return in the inverse order to that in which they appeared, a result which is due to the reoxidation of the indigo.

The reaction is truly a beautiful one, but for further details we must refer the reader to Dr. Oliver's little book, adding here that the test-papers, both for albumen and sugar testing, may now be obtained in this country, of Parke, Davis & Co., neatly packed in a box along with a graduated test-tube and dropping-tube, and directions for their use.

Dr. Oliver has carefully compared this test with Fehling's, which he regards as the best glucose test, with results indicating equal delicacy. Further, he has compared the behavior of the indigo-carmin, the cupric and picric tests, when boiled in the presence of various substances. These are his results:—

Of the constituents of normal urine found as giving *no reaction with indigo-carmin or Fehling*, are urea, kreatin, kreatinin, urates, chlorides, phosphates, unoxidized sulphur, hippuric acid, sulphates, lactates, oxalates, ammonia, butyric acid. Of these, kreatin and kreatinin reduced the alkaline picric solution. *Indigo-carmin remained unchanged, but Fehling*

was reduced by uric acid, oxalic acid, and lactic acid. Of constituents of abnormal urines, leucine, tyrosin, albumen, peptones, non-saccharine bile, blood, pus, and mucus gave no reaction with indigo-carmin or Fehling. Indigo-carmin, Fehling, and picric acid were all reduced by ammonium sulphide. Indigo-carmin and picric acid were reduced by inosite, and Fehling was turned olive-green by it. Of other substances, cane-sugar, pure glycerine, mannate, boiled starch, gum acacia, glycyrrhizin, and salicin produce no reaction with indigo carmin or Fehling, while gum acacia reduces picric acid, and milk-sugar and dextrin reduce all three. Of medicinal substances quinine, morphia, codeia, atropin, caffeine, santonin, strychnine, balsam of copaiba, benzoate of lithia, hypophosphates, iodides, liquor pepticus, ether, and arbutin, exhibit no reaction with indigo-carmin and Fehling. Iron sulphate, gallic and tannic acids reduce all three reagents. Indigo is unaffected while Fehling is reduced by chloroform, resin, carbolic acid, sodium salicylate, jalapin, and chloral. *The urine of persons taking chloral hydrate reduces Fehling's solution*, the bismuth test, and salts of silver. In summary, out of 64 substances experimented with, Fehling was reduced by 15, picric acid by 11, and indigo-carmin by 8.

The quantitative testing by the indigo papers is only claimed by Dr. Oliver to be approximate. To us it seems troublesome, but so much depends in these matters upon habit and personal experience, that it is not fair to judge from such a limited opportunity as our own. To the practitioner, any test requiring apparatus even slightly specialized, is apt to be discarded for that which requires only simple tubes. We hold that for sugar some kind of quantitative testing is absolutely necessary, and the simpler the means by which it can be accomplished, the more likely are those means to be used. With Fehling's solution a sufficiently accurate quantitative estimation of sugar may be made with the test-tube and graduated measure, or even graduated test-tube and the spirit lamp. Even Dr. Johnson's standard fluid and apparatus, simple as they are, are in the way of the availability of the picric acid for quantitative testing. Other things being equal, the test of the value of a test is its availability. Each of the three tests is sufficiently accurate if intelligently handled, while perhaps the Fehling's solution requires most skill in its use for small quantities of sugar, and we await with interest the result of a year's experience of the profession with them, after they have become sufficiently known. J. T.

ART. XXV.—*The Diagnosis of Diseases of the Spinal Cord.* By W. R. GOWERS, M.D., F.R.C.P., Assistant Professor of Clinical Medicine in University College, Physician to University College Hospital, and to the National Hospital for Paralyzed and Epileptics. Third edition, pp. 92. Philadelphia: P. Blakiston, Son & Co., 1884.

THE admirable manual of Dr. Gowers, issued in 1879, has done much to stimulate the intelligent study of diseases of the cord, and that such a guide was really wanted is shown by the exhaustion of two large editions within four years. The only important change in this edition is a new section on the diagnosis of functional from organic lesions of the cord, to which

we will briefly refer. In hysterical paraplegia there is no disturbance in the central functions of the cord, but "there is loss of power over the legs on account of the peculiar ungearing state of the volitional centres, which is at the root of all true hysteric palsy." The various objective indications of spinal trouble are absent; reflexes and sensation are normal; no muscular wasting, no incontinence. With these negative features there may be positive indications of great value in establishing the diagnosis, as the presence of unequivocal symptoms of hysteria; the mode of onset, emotional shock a frequent cause; the development occupies some days, or even weeks; and, thirdly, the character of the weakness, which is rarely absolute. In some cases there are indications of disturbance of the functions of the cord; spinal tenderness, increase in the irritability of the muscles, knee-jerk excessive, and a spurious ankle clonus may be obtained. Owing to the great diagnostic importance of the true ankle clonus it is well to understand the character of the voluntary or spurious form, which may occur in hysterical paraplegia. In the typical true form the clonus begins when the foot is first pressed up, and continues so long as the pressure is maintained; but in the voluntary form "there is no clonus for the first few seconds, then the foot and the observer's hand are pressed down by a voluntary contraction of the calf muscles which is broken by clonus." In persistent hysterical contracture, however, there may be a regular persistent clonus. It is sometimes a difficult matter to decide, as we well remember in a case with many hysterical aspects, in which a diagnosis of organic disease was made, relying on the existence of what was regarded as a true ankle clonus, but after two years' spinal trouble complete recovery corrected the diagnosis. Where there is rigidity of the legs, the question as to whether it is true spasm of hysterical contracture is still more difficult to decide. In the latter the spasm is greatest at the extremity of the limb and is constant, but can be overcome by steady pressure, and the clonus is variable. In spastic paraplegia the spasm is equal throughout the limb, variable in intensity, almost exclusively extensor, and the clonus is uniform.

W. O.

ART. XXVI.—*The National Dispensatory: Containing the Natural History, Chemistry, Pharmacy, Actions and Uses of Medicines, including those recognized in the Pharmacopœias of the United States, Great Britain, and Germany, with numerous references to the French Codex.* By ALFRED STILLÉ, M.D., LL.D., Professor Emeritus of the Theory and Practice of Medicine and of Clinical Medicine in the University of Pennsylvania; and JOHN M. MAISCH, Phar. D., Professor of Materia Medica and Botany in the Philadelphia College of Pharmacy. Third edition, thoroughly revised, with numerous additions. With three hundred and eleven illustrations. Royal 8vo. pp. xvi., 1755. Philadelphia: Henry C. Lea's Son & Co., 1884.

THE National Dispensatory was published early in 1879. It was so well received that a third edition has been issued in a little more than five years after the appearance of the first. This fact implies that the quality of the work is highly appreciated, and that it is now a standard of reference well established in the opinion of the medical public, a position which its merit entitles it to hold.

Compared with the first, this edition is much improved, and is enlarged by 127 pages. The length of the page is increased by six lines, and the lines are more than a half an inch longer, so that the volume contains much more matter, probably equivalent to the contents of at least 200 pages of the first edition; and 110 illustrations have been added.

The theme of exegesis here is chiefly the Pharmacopœia of the United States, with the British, German, and French Pharmacopœias, according to the latest revisions. To justly estimate the labor bestowed on this work, we should remember that a pharmacopœia is only a collection of formulas for the preparation of standard compounds selected or devised by competent persons under recognized authority, mainly for the guidance of apothecaries, in which descriptions of constituent materials are limited to diagnostic characteristics, without indication of dose or peculiar virtue of any of them; and that a dispensatory, besides the gist of the pharmacopœias which it expounds, embraces names and synonyms, origin, chemical and commercial history, physical properties, methods of preparation and administration, pharmaceutical uses, effects on living organisms, doses and clinical application of every medicine or compound named in the pharmacopœias, and also of every article, though not recognized in them, that is employed in the treatment of disease. A dispensatory is, in fact, a full summary of materia medica, pharmacy, and therapeutics, a repertory of knowledge in the premises, to which physicians and apothecaries may confidently refer.

The varied and extensive attainments, coupled with painstaking industry and habitual accuracy of statement, necessary to produce such a book, are very rare. In the volume before us, there is abundant evidence that the authors of the National Dispensatory possess all the requisite qualifications for the work, and that they have used them without stint and with eminent success. Seemingly, all English, German, and French authorities in materia medica, pharmacy, and therapeutics, the most recent publications and reports, have been consulted, considered, and judiciously referred to, so that we have presented to us in the account of every article named a summary of what is known or supposed to be known about it at the date of publication.

Without any reason which is now conclusive or apparent, the satisfactory method of expressing the quantities of materials embraced in the formulas of the fifth revision of the Pharmacopœia, 1870, in definite weights and measures, was abandoned, and, in the sixth revision, 1880, a mode of stating quantities in "parts by weight" only, was adopted, much to the dissatisfaction of a vast majority of those who have occasion to make them up. To obviate the inconvenience arising from this source, to facilitate the working of the formulas of the Pharmacopœia of the United States of 1880 by practical physicians and pharmacists, "parts by weight" are translated, in the National Dispensatory, into definite apothecaries' weights and measures, stating also their equivalents in the terms of the metric system, but only proximately. Measures of temperature are stated according to both the Fahrenheit and Centigrade scales, although only Fahrenheit's thermometer is in common use in the United States. This provision of duplicate terms for weights and measures to suit different tastes somewhat mars simplicity of directions, without securing any apparent practical advantage; it merely emphasizes an opinion that expressing quantities in "parts by weight," and recognizing the metric system at this time in the Pharmacopœia of the United States, is premature.

Some optimists may believe that all nations should speak only one and

the same language, make coins of the same name and value, and, as a first step towards the wished-for state, that only one unit of measure, of weight, and of temperature should be lawfully employed by all peoples alike; but it will be yet very long, nevertheless, before practical men of the Anglo-Saxon family—the bread-winners—who employ weights and measures in their many daily vocations, as land-surveyors, constructors of buildings and ships, machinists, mechanics, traders—will be convinced of the necessity, or propriety even, of adopting the Centigrade thermometer and the metric system of weights and measures exclusively, seeing that the metric system rests, in fact, on an arbitrary basis, and is not more exact or convenient than any other. Comparatively few Americans are in favor of it. It is conjectured that probably less than ten per cent. of all the physicians and apothecaries in active professional business, including those among us of foreign birth, or parentage, look forward to the introduction of the use of the metric system in prescribing, and into the pharmacist's laboratory, as an improvement fraught with palpable benefit in any sense to either practitioner or patient. The question whether the entire system, standards, and names of the weights and measures in lawful use by fifty millions of people shall be totally changed without lawful authority, is profoundly important. It is made very complex by the multitude of interests concerned, and, therefore, its solution should be confided to our wisest statesmen in authority. Until after the national legislature has determined that the people shall use the metric system, its adoption by any profession or class seems untimely, although statutes of the United States permit its use at this time. If the Pharmacopœia of the United States of America were prepared and published under the direct authority of the government, and it is hoped the next revision will be, it is probable that quantities would be expressed in it only in the lawfully prescribed weights and measures in common use, and in this respect not in advance of the times.

The appendix of the National Dispensatory contains a table of maximum doses; tables of different weights and measures; rules for converting apothecaries' weights and measures into their respective equivalents into metric terms; a table relating to specific gravities of liquids; a table for comparing degrees of the Centigrade and Fahrenheit thermometers; a table of elements, and a list of reagents.

A general index, in three columns, occupies 66 pages, and an index of therapeutics, 34 pages.

In every respect, the work, in all its parts, is well done, and creditable to both authors and publishers. Their enterprise deserves success.

W. S. W. R.

ART. XXVII.—*Traité des Fièvres Biliéuses et Typhiques des Pays Chauds.*

Par le Dr. A. CORRE, Médecin de 1re Classe de la Marine; Professeur Agrégé à l'École de Médecine Navale de Brest. Avec 35 Tracés de Température dans le text. 8vo. pp. 567. Paris: Octave Doin, 1883.

A Treatise on the Fevers of Hot Climates. By Dr. A. CORRE.

THIS elaborate and learned treatise, written from the standpoint of the naval surgeon, and devoted to the consideration of a group of diseases peculiar to or greatly modified by their occurrence in tropical and sub-

tropical lands, will scarcely come into the hands of many of the readers of this journal. Nevertheless to a discriminating few, whose lot is cast in such lands, it will be in some respects very welcome and useful. It will find place also upon the shelves of physicians who are interested in the study of the general subject of the fevers.

Dr. Corre in the preface briefly informs his readers how he was led to write this book. Unable to accept the description of certain pyretic diseases, as they stand in the classic works on medicine, he has undertaken to recast the whole subject of these bilious and typh-fevers (*fièvres bilieuses et typhiques*) as they are observed in hot countries. His reason for this undertaking is that the systematic accounts are so incomplete and misleading, and the differential diagnosis so obscure, that these diseases have been declared to constitute the chaos of inter-tropical pathology. He has not been unaware of the difficulties of this task, nor does he pretend to have solved a problem which is worthy of the converging labors of more than one generation of students. But he has striven to render the labors of those who follow him in the investigation of exotic fevers easier and freer from obstacles.

The preface concludes as follows:—

“ Nous avons observé et nous avons apprécié les faits avec conscience et indépendance: nous souhaitons que nos lecteurs jugent notre œuvre avec l'esprit qui nous l'a dictée.”

One may truly write an excellent book and make shipwreck of a page of preface.

A general study of fevers very properly leads the way to the consideration of the special fevers, which are taken up in the following order:—

I. (a) Common bilious fever or gastro-bilious fever (*Fièvre bilieuse banale, ou gastrique bilieuse*).

(b) Ardent or inflammatory endemic fever (*Fièvre dite bilieuse inflammatoire*.)

II. Remittent fever (*Fièvre bilieuse paludéenne*).

III. Bilious remittent with hæmaturia, hæmorrhagic malarial fever (*Fièvre bilieuse hématurique ou melanurique hémoglobinurique*).

IV. Typho-malarial fevers (*Fièvres typho-malariques*).

The author understands by typho-malarial fevers, pyrexias which, engendered under the double influence of malarial conditions and typh conditions (*conditions typhiques*), present an association of phenomena suggesting both sources of intoxication.

There are three forms:—

1. Fevers that are typho-malarial by association or duplication. Here there is a parallel and simultaneous evolution of two pyrexias, each developed under the influence of its own infection, independently of its congener.

2. Fevers that are properly called typho-malarial. Here the pyrexia is simple, engendered under the influence of a single agent (*typho-malaria*) originating externally to the organism infected. These fevers may be designated clinically by the term *fièvres malarieuses typhoidiformes*.

3. Transformed typho-malarial fevers, in which the malarial fever becomes typhoid (*typhique*), under the influence of an infection engendered by the organism itself. This form is called *fièvre malarieuse typhoid par transformation*.

This subject, and much that follows it, are rendered obscure by the retention of the old view as to the common etiological relations of the group

of fevers to which the term *typhus* was formerly, and is still by Continental writers comprehensively applied; and of which typhus recurrens (relapsing), typhus exanthematicus (typhus), typhus abdominalis (enteric), typhus amaril (yellow fever), and typhus cerebro-spinal (cerebro-spinal fever) are looked upon as varieties.

Great indeed must be the state of confusion in which this subject of the fevers exists in the classical treatises, if the nosological arrangement of the author is an improvement upon it. Compared with the simple plan of English and American pathologists, which refers particular fevers to single and distinct (specific) causes, it is indeed, "a chaos of pathology." Dark indeed must be the border land of differential diagnosis, if this arrangement can illumine its obscurity.

V. Relapsing fever. (Typhus récurrent et fièvre typhoïde-bilieuse—typhus collapsive.)

This fever is defined as an epidemic fever observed under an especial medical constitution (*une constitution médicale particulière*), to which miasmatic influences appear to be not always foreign, and under conditions which ordinarily give rise to *typhus exanthematicus*; a fever characterized by special phenomena of a typh (*typhique*) character, often accompanied by the bilious state, by tendency to adynamia, by relapses under the form of recurrence at long intervals, by the habitual presence of a spirillum in the blood, by the frequency of enlargement and softening of the spleen. Relapsing fever is described and classed with the "bilious-typhoid" of Greisinger and other writers as one, the latter being the specialized form that occurs in tropical climates.

VI. Yellow fever (Typhus amaril, ou fièvre jaune),

VII. Enteric or typhoid fever. (Typhus abdominal, ou fièvre typhoïde, and in the same chapter and under the same general heading),

VIII. Typhus fever (Typhus exanthématique), and,

IX. A form of typhus peculiar to the high inter-tropical plateaus (Typhus des hauts plateaux des regions inter-tropical).

This last fever has been observed among the peoples dwelling in the high regions of Peru and Mexico. It has been variously looked upon, sometimes as enteric, sometimes as typhus fever, but the author, whose efforts to observe facts with conscience and independence (*avec conscience et indépendance*) have been clogged by the very traditions from which he seeks to escape, agrees with Jourdanet, in regarding this fever as due to an original form of typh-activity (*typhism*), whatever that may be. This opinion is shown to be untenable by the evidence adduced to prove it, namely, the symptomatology and pathological anatomy of the disease, which are clearly those of enteric fever, modified, perhaps, by the high altitude, perhaps by the soil, or by both, in which it exists.

This book is written in a style learned without pedantry, exact without undue minuteness of statement, graphic and simple; its descriptions are brief, terse, and accurate; its sincerity manifest, its erudition profound. Yet its author has been so hampered by doctrines no longer tenable, and in truth so little recognized as to be almost unknown to English students of our day, that to place it in the hands of our medical students would result in a bewilderment that would indeed amount to a "pathological chaos" come again.

J. C. W.

ART. XXVIII.—*On the Pathology and Treatment of Gonorrhœa.* By J. L. MILTON, Senior Surgeon to St. John's Hospital for Diseases of the Skin, London. Fifth edition. 8vo. pp. viii., 306. New York : William Wood & Co., 1884.

MAN is everywhere a combative animal, and no ethnological line can be drawn, on one side of which it may be said men do, and on the other side men do not, love to see a fight. And it is especially true that men love to see a single man holding his own against a number of opponents. To such a spectacle this book of Mr. Milton's invites the reader. From beginning to end it is controversial, and this apparently not from choice, but from necessity. In the preface the author testifies his appreciation of the criticism his attitude to others will provoke. "It is not to be expected," he says, "that the adverse judgment passed upon many remedies, which have been at one time or other so strongly advocated, will prove acceptable to those who recommended them to public favor. But for this there is no help. Experience compels me to say that they have not fulfilled the expectations which the first accounts of them were calculated to raise." In the context the promise with which this sentence is big is abundantly fulfilled.

Mr. Milton begins with a study of the antiquity of gonorrhœa, in which he not only attempts to refute the arguments of those who find evidence of its existence since the earliest times of human history, but also ridicules some of their evidence unstintedly. It may be because of a bias in favor of his views that we enjoy Mr. Milton's statement of them, and think it very well done. As he cites one after another of the writings upon which the opinion that their authors were familiar with gonorrhœa rests, we not only admire his thoroughness, but sympathize with the righteous indignation he seems to feel that such broad claims should rest on such slim pretensions. Similarly, when he treats of the relation of acrid vaginal discharges to the production of a running disease of the urethra, we are moved with admiration, although here it may be another prejudice which prevents our thinking his reasoning quite so conclusive as we found it before. And yet, one very firmly wedded to the belief that gonorrhœa is simply a urethritis, and not of a specific nature—we do not mean syphilitic, of course—may well ponder the arguments with which Mr. Milton supports the opinion that it is a specific urethritis. He may be right, notwithstanding the fact that he is almost alone in his present opinions.

One of the most interesting parts of this book treats of the results of gonorrhœa. Here he occupies a few pages in annihilating, *quoad hoc*, Dr. Noeggerath, of New York, and his applauder, Dr. Angus McDonald, of Edinburgh. The former has given accounts of the effects of this disease, which, Mr. Milton says, "are enough to make one's hair stand on end." These accounts, the reader will probably know, included a degree of impotence on the part of men and of sterility on the part of women which, as it is easy to calculate, would in a short time depopulate any country. Of course, they were erroneous; and one wonders how Dr. Noeggerath ever came to put them before a world which has some experience of its own to guide it, and some ability to see the absurdity of the legitimate conclusion of such exaggerations.

To the views of others, which he cannot indorse, Mr. Milton opposes himself, not only when he has some positive opinion of his own to offer,

but also when he has to confess that he is stumbling blindfold through a conjecture; for he holds truly, that it is doubtful if ever an erroneous hypothesis assisted in the discovery of a truth which men would not have found out equally well without it.

But, interesting as the more theoretical parts of the book before us must prove to every reader, it is likely that the majority will care most for what the author says as to the treatment of gonorrhœa. Here his large experience adds great weight to whatever he says. Here, again, however, he is to be found in the habitual attitude of a sole, brave contestant. But it is fine! He turns to every side, both attacking and repelling attack. His sweeping ridicule spares no one whom it can be made to reach. Again and again it cuts down those who have claimed so much for certain methods as to make them fair objects of criticism. "There may be too much of a good thing," he says once, "and I think we have had too much in the shape of novelties for many years past; merely adding to the list of remedies, already long enough, many of which are just as useful as a beane putte into ye harte of a black cat, and can do no good whatever." His own reflections upon the present state of the therapeusis of gonorrhœa lead him to the statement that it is in inextricable confusion. Besides suggestions which he rejects with little ceremony he takes up and considers in detail the merits of a number of more or less commonly employed plans. After all, he comes back to the use of injections and the local application of heat to the penis, in his well-known way. *For injections he makes a strong plea, and defends them against the imputation that they cause stricture and orchitis. But he makes it clear that he speaks as to wise men, and cannot be held responsible for the consequences of fool-hardiness or carelessness.

The attempt to abort an attack of gonorrhœa Mr. Milton thinks justifiable: 1. When patients present themselves before great pain and running have set in. 2. In cases when the patients have had gonorrhœa before, and the present attack does not appear to be very severe. 3. Where the patient is desirous of an immediate cure at any price. To secure the object desired the patient must make water, and then receive an injection, at the hands of the surgeon, of a solution of nitrate of silver, five grains to the ounce of distilled water. This injection should be retained for several minutes. If great pain ensues it is to be treated by bathing the penis with hot water; and a hot bath will generally remove any pain which resists the local application. After the injection four or five grains of calomel are to be given, followed by a saline, or mixed saline and vegetable, purge every two hours till the bowels have been well scoured out by several loose stools. The diet is also to be restricted, and light. After each stool the patient is to use an injection of the sulphate of zinc, three to five grains to the ounce. This plan persevered in for a day or two will effect a cure by that time, or it will be clear that the case is not amenable to this sort of treatment. In the latter case Mr. Milton advises the use of mild diuretics and aperients.

As an outcome of his experimentation in regard to formulæ for the ordinary treatment of gonorrhœa, Mr. Milton gives the following prescriptions: 1. R.—Potassæ chloratis, ℥ij; aquæ bullientis, f℥iv.—M. et agita bene, donec solutio fit, dein adde potassæ acetatis, ℥ij; spir. juniperi, f℥ss; mist. camphoræ q. s. ad f℥vj.—Misce. Sig. Coch. ampl. duo bis quotidie sumenda. 2. R.—Pil. colocynth. comp., ℥ss; hydrargyri, ℥ss; ext. hyoscyami, ℥j.—M. Ft. pil. xij. Sig. Sumat j vel ij horâ decubitura.

In the curative power of these two prescriptions Mr. Milton has great faith. But a number of cases require the additional use of injections. The best salt for this purpose is the nitrate of silver, to be injected by the surgeon, in a strength of half a grain to the ounce of water at first, and gradually rising to that of from two to ten grains in accordance with the patient's tolerance of it. The patient must also use at home an injection containing one or two grains of the sulphate of zinc and a quarter or half a grain of the chloride of zinc to the ounce of water. This injection, like the preceding, is to be increased in strength as the case goes along, being always strong enough to produce a slight sense of heat for ten or fifteen minutes. Mr. Milton advises the use of a syringe with a nozzle at least an inch and a half long. This is best made of silver, drawn solid, while the barrel is of glass. In regard to the results of treatment in this way Mr. Milton remarks that he cannot satisfy himself as to the average time the cases require. "A great many get well," he says, "in from four to fourteen days;" but he has seen cases that made little apparent improvement in as much as four, and even eight weeks.

The part of this book which follows is occupied with a consideration of the complications of gonorrhœa, and with its great sequela, gleet; but on this we have not time to dwell.

On the whole, we regard this as a very interesting and instructive book. It is the fruit of a ripe experience, and with all its opposition to the opinions and assertions of others, it does not fall into rudeness, and, indeed, preserves a remarkable restraint in view of the comparatively lonely position occupied by the author, to which we have referred, and which he evidently feels. We cannot but think he sometimes hits harder than is necessary; but no more can we escape the conviction that he feels that he is coming to the rescue of the truth, and that the truth is being smothered under a mass of false appearances and false logic. To expose the real nature of these, as he intends to do, is a work deserving sympathy and coöperation from all men. The author may not be altogether right, nor those who differ from him altogether wrong; but in his motives he is undoubtedly right, and no one who is moved by like motives can blame him much for a zeal which speaks plainly in so good a cause. C. W. D.

ART. XXIX.—*Recherches cliniques et thérapeutiques sur l'Épilepsie, l'Hystérie et l'Idiotie, compte rendu du service des épileptiques et des enfants idiots et arrières de Bicêtre pendant l'année 1881*, par BOURNEVILLE, Médecin de Bicêtre. Bonnaire (E.) et Wuillamié, internes du service. Paris: Aux Bureaux du Progrès Médical, 1882.

Recherches cliniques et thérapeutiques sur l'Épilepsie, l'Hystérie et l'Idiotie, et arrières pendant l'année 1883, par BOURNEVILLE, Médecin de Bicêtre. Bonnaire, Bontier Leflaive, internes du service; P. Brezin et Séglas, Docteurs en Médecine. Volume iv., avec 8 figures et deux planches. Paris: Aux Bureaux du Progrès Médical, 1884.

THESE two volumes contain a large amount of valuable clinical and pathological work which the authors have been able to do in connection with the service for epileptics and idiots at the Bicêtre. As we learn by the introductory statistical section the number of inmates on December

31, 1881, was 297, of whom 71 were idiots or imbeciles, and the remainder epileptics, adults and children, and of sound or unsound mind. At the same time, 1883, there were 305 patients, of whom only 19 were idiots or imbeciles, and the greater number epileptics.

The clinical report for 1881 opens with an account of three cases of idiocy with remarkable cerebral changes. In two there was an hypertrophic sclerosis of certain of the convolutions due to a local proliferation of the connective tissue elements, and in a third a remarkable condition of meningo-encephalitis in a child of 12 years of age. Over the entire right hemisphere, with the exception of the temporo-sphenoidal lobe, the pia mater and the gray matter were so closely united that in the removal the latter came away from the white substance as a distinct fold or shell. The child had convulsions for six years and left hemiplegia. Two interesting cases of microcephaly are reported at length, and five plates illustrate the condition of the brains, which weighed only 640 and 650 grammes. The details of the structure are given at great length, and illustrate, what is not generally recognized, that a brain may be very small and yet the convolutions regular and proportionate. Other cases of interest are: *rheumatic arthropathies in an ataxic, epilepsy with extensive lesion of the insula, hystero-epilepsy in a boy treated successfully by the cold douche, epilepsy with osteomalacia*; and lastly, a description of an outbreak of measles among the children.

The volume for 1883 contains an elaborate article of 86 pages on Merycism or Rumination in Man, a subject in which French writers appear to have had a particular interest. After a preliminary account of the physiology of the act in ruminants and a discussion of the question whether in man it is morbid phenomenon or not, the whole history of the subject is exhaustively considered.

Thirty-seven cases are noted, five of which occurred in the service of the Bicêtre. Of these, twenty-four were in persons of sound mind, the remainder in idiots or the insane. The act must be distinguished from vomiting on the one hand and simple regurgitation on the other. It is a voluntary effort accomplished largely by the stomach and œsophagus, and the food which is raised is subjected to a second mastication. The sensations accompanying the act are often pleasurable. Imitation sometimes plays an important part in the causation, as in the case narrated by Kœrner, where two children took up the habit from an hysterical and ruminating governess. Two forms, simple and dyspeptic, described by Kœrner, are recognized. In the former the act only succeeds a very full meal, beginning half an hour after, and the food retains its proper taste. It is only at the end of the act, after the lapse of half an hour, that the taste becomes acid and unpleasant. In the dyspeptic form the act may begin almost immediately after the ingestion of even a small quantity of food, and the taste is usually acid and disagreeable. Two of the cases at the Bicêtre died of other affections, and no special changes were observed in the stomach or œsophagus. The second article is on a case of *Hystero-epilepsy* in a boy cured by hydrotherapy; the third on *chronic meningo-encephalitis with idiocy*, the chronic inflammation in this case being more irregularly distributed over the hemispheres. The fourth paper is upon a case of *idiocy consecutive to hydrocephalus*, and the last upon *idiocy from simple atrophy* of the brain.

These valuable reports afford an excellent illustration of what good work can be done when the clinical and pathological material of an institution is fully utilized.

W. O.

ART. XXX.—*A System of Human Anatomy, including its Medical and Surgical Relations.* By HARRISON ALLEN, M.D., Professor of Physiology in the University of Pennsylvania, etc. etc. *Section V. Nervous System. Section VI. Organs of Sense, of Digestion, and Genito-Urinary Organs.* 4to. pp. xv., 582–812. Philadelphia: Henry C. Lea's Son & Co., 1883.

"ALLEN'S ANATOMY" is now published in full, Sections 5 and 6 completing the work. In them are considered the *nervous, digestive, respiratory and genito-urinary systems*, together with sub-sections on *topographical anatomy*, on *malformations*, and on the *method of making post-mortem examinations*. If anything were necessary to convince us that there has been progress made in anatomy in these latter years, the required evidence might easily be found in a comparison of what is here written on the spinal cord and brain, with that presented in the text-books and reference volumes of twenty-five years ago. More than fifty pages of Section V. are occupied with the macroscopical, microscopical, and developmental features of the new anatomy of the central organs; and the value of such anatomical knowledge is shown by frequent references to reported clinical facts. In like manner in the consideration of the cranial and spinal nerves, while origin, course, and distribution are clearly stated, cases in illustration of their pathology are freely introduced.

The Soemmering classification of the cranial nerves is adopted. The usual exactness of anatomical description is occasionally interrupted by statements, the errors of which must be attributed to defective proof-reading. For example, the nucleus of origin of the fourth nerve is on one page placed directly in *front* of, and on the next page *behind* that of the third; a filament joining the lingual is derived from the mylo-hyoid muscle; the external branch of the spinal accessory is stated to pass "obliquely downward and outward between the *common* carotid artery and the internal jugular vein"; the fourth and ophthalmic branch of the fifth are given as *entering* the cavernous sinus, though elsewhere properly located in its outer wall. The Vidian is described as coming from the sphenopalatine ganglion, but later it is stated that the present belief is that it passes *toward* the ganglion. Due notice is taken of Bigelow's and Sapolini's views of the origin of the chorda tympani.

The spinal cord, "with the exception of the terminal filament," is stated to be "within the cervical and *lumbar* portions of the vertebral canal." The branches of the brachial plexus are classified according to the groups of muscles to which they are distributed; one set going to the trunkal muscles, a second to the extrinsic muscles of the upper extremity, and a third to its intrinsic muscles. Attention is called to the fact that after division of the tendon of the biceps femoris, the external popliteal nerve "springs up so as to occupy its place, feeling as tense as the tendon did before division. The inexperienced operator may conclude that the tendon has not been completely divided, and under these circumstances the knife may be reintroduced, and the nerve divided." The middle cardiac nerve of the sympathetic is stated "to run downward behind the *internal* carotid artery, and enter the thorax either in front of or behind the subclavian artery."

Section VI., nearly one-third of the entire work, is devoted chiefly to the *organs of sense, of digestion, of respiration, and the genito-urinary*

organs; the last fifty pages being given to *superficial anatomy*, to *malformations*, and to the *method of making post-mortem examinations*.

Neither time nor space permits of any detailed consideration of the thorough and excellent way in which are treated the numerous and important subjects of the first part of this section. The *eye*, the *ear*, the *nose*, the *mouth*, the *larynx*, the *lungs*, and the whole *alimentary* and *genito-urinary tracts*, with their appended organs, are here found treated of, and the sub-section closes with a description of the *skin* and *nails*. Reference must be made, in passing, to the valuable table (from L. Mayer) given in the sub-section on the *liver*, and "designed to show the character of the lesions of internal organs accompanying gunshot and other wounds in the neighborhood" of that viscus. The page-heading "organs of sense" has been carried over quite a distance into the part of the work devoted to the "organs of digestion."

Of the second part of the section, nearly one-half the pages are devoted to *superficial* and *topographical anatomy*; a subject the value of which every anatomical teacher must recognize, while at the same time fully aware how little knowledge of it is possessed by students in general. Though in the various text-books of late years published in Great Britain and our own country, increasing attention has been given to this surface anatomy of the living body, still in no one of them is the treatment of the subject anything like so full and instructive as here.

In the pages in which is given "a brief outline of those phases of embryology which may be held to be useful in studying congenital defects," the author discusses the *causes and varieties of malformations*, the *parts of the embryo in which they occur*, and the *forces which underlie the congenital forms*. Förster's classification (with his well-known figures) is presented, Foster and Balfour's writings on foetal development are freely quoted, and a number of Dalton's familiar plates are introduced. In writing of "Errors of Mesoblastic Origin" it is suggested that "it would be a useful tentative position for the pathologist to accustom himself to view many forms of morbid growth, particularly the myxomata and sarcomata, as expressive of mesoblastic development occurring out of place and order." Exception is taken to the use, aside from its convenience, of the term "twin," in speaking of double monsters: "A twin, strictly speaking, is one of two born at a birth. A double monster is a single individual, and, as such, arises from a single blastodermic membrane overlying a single vitellus."

For the making of post-mortem examinations very full and precise rules are given. In the opening of the abdomen, it is recommended to make a transverse incision just above or below the umbilicus. In private practice it is generally more advisable to add to the longitudinal incision simply a free division of the rectus fibres a short distance above the pubes. When special attention is to be given to the state of the heart, it is directed that the liver be left in position "until the thorax has been opened and the heart examined." For the removal of the nasal chambers and the ears for special study Schalle's method, "undoubtedly the best," is recommended, and considerable space is devoted to a description of it.

To this section is appended what will add not a little to the comfort of those using the work, very full general and clinical indices.

Appearing, as it has, in serial parts, it is only now, with the last section in hand, that any just estimate can be formed of the value of this "System

of Human Anatomy." Everywhere throughout the work appear evidences of the immense labor connected with its preparation, and of the author's constant effort to present with the anatomical facts such clinical applications as may at once illustrate and impress them. Whether to the ordinary student "receiving first impressions of this great subject," such "union of the descriptive and the clinical data" is of service, is a question; but there can be no doubt of its great value to one more advanced, especially to the general practitioner, from whose mind unapplied anatomical details so easily and so quickly slip away. To such practitioner the work under review will be a perfect treasure-house of knowledge, to which he will turn again and again.

Until a later edition may appear, free from the numerous errors that now mar the work and seriously impair its value, the reader should be in possession of such knowledge of descriptive data as will enable him to make the necessary corrections. Though, almost without exception, the present errors are such as might and would have been at once avoided had there been more careful revision of the proof, yet no one knows better than the author that, as an anatomical statement is either exactly right or exactly wrong, absolute accuracy must characterize any work which will be accepted as an authority. Freed from its blemishes, "Allen's Anatomy" would receive from every one merited praise as the most valuable work on anatomy published in the English language, and from such blemishes it can easily be freed. The more it is studied the more valuable it appears, and the more apparent becomes the obligation the reader is under to its distinguished author, whose industry and learning have brought together and in relation such a multitude of descriptive data, and of clinical facts bearing thereon.

P. S. C.

ART. XXXI.—*Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects.* Vol. v. Flaccus-Hearth. 4to. pp. [ii] 1055. Government Printing Office, Washington, 1884.

FROM the summary of the contents of this volume contained in the brief prefatory report of Dr. Billings we learn that it includes 15,555 author-titles, representing 5755 volumes and 12,596 pamphlets. It also includes 8069 subject-titles of separate books and pamphlets, and 34,127 titles of articles in periodicals.

All this vast list is classified according to the rules which have obtained in the arrangement of the previous volumes. Those rules are such as have received the approbation of librarians generally, and even were this not the case, the decision of so competent an authority as the gentleman who has done this work, with such an abundance of material at command, would be enough to establish the rule. We speak of these methods as those generally approved, but no system of classification yet adopted in medical literature has received unanimous consent. To each one there are objections which can be fairly urged, and none which will meet all requirements. Thus gastrotomy and gastrostomy are both included under the latter title, and the reader is pointed by cross reference to abdominal and Cæsarean section, to fistula, intestines, ovariectomy, pregnancy, and

stomach for further information on the subject. Indeed most of the titles referred to under this head are of cases which accurately writing surgeons generally speak of as gastrostomies. On the other hand, however, it may with propriety be urged that whenever the belly is opened by incision a gastrotomy is done, whether the object be to form a mouth there, to remove a growth or foreign body, to remedy an obstruction, or repair an injury. We incline to the opinion that it would have been more precise to term all cases in which gastrotomy was done for the purpose of establishing a mouth, gastrostomies, even though many of those reporting them make use of the more general title.

Eleven pages are occupied with additions to the list of medical periodicals, and their abbreviations, employed in the Index-catalogue, thereby indicating undiminished care in the final preparation of the volume for the press.

Of the value of this catalogue we have repeatedly spoken in previous notices, as the successive volumes have appeared, and we can only emphasize those opinions now. To the scientific medical worker, the library of the Surgeon-general's office is simply of inestimable value, and to a proper use of it a catalogue is indispensable. By consulting the pages of the Index-catalogue in any neighboring public library the student can learn what this great repository at Washington contains suited to his need, and can either secure the loan of the required volumes, under a suitable guarantee, or can, like Carlyle, when he visited Germany to secure materials for his life of Frederick the Great, make a pilgrimage to the American Capital, and consult its treasures on the spot. In adopting this latter course, he will find every facility afforded him for a thorough examination of the books he wishes to consult, and it is to be hoped he may do so without the absurdly amusing discomforts which attended all the journeys of the Chelsea sage.

Now that the fever of political excitement is in some measure abated, it is to be hoped that Congress may be persuaded to give proper consideration to the claims of this great library, may resist the attempt to merge it in the Congressional library, may provide it with a suitable fire-proof building of its own, and may make such adequate appropriations as will permit of a speedy issue of the remaining volumes of the invaluable Index-catalogue.

S. A.

ART. XXXII.—*Clinical Chemistry*. By CHARLES HENRY RALFE, M.A., M.D., Cantab., Fellow of the Royal College of Physicians, London, Assistant Physician at the London Hospital, etc. 16mo., pp. 308. Philadelphia: Henry C. Lea's Son & Co., 1884.

The Elements of Physiological and Pathological Chemistry. By T. CRANSTOWN CHARLES, M.D., Fellow of the Chemical Society and Royal Medical, Chirurgical, and Pathological Societies; Demonstrator of Physiology and Physiological Chemistry, St. Thomas's Hospital Medical School, etc. Large 8vo., pp. 463. Philadelphia: Henry C. Lea's Son & Co., 1884.

THE above two works are very similar in their general scope and character; and appearing, as they do, almost simultaneously, they may very naturally become the subjects of one common review.

No argument is needed to justify the important position now universally conceded to chemistry by the educated physician, especially in clinical teaching. To it and to the microscope are we particularly indebted for the rapid advances made within the last quarter of a century in histological, pathological, and therapeutical studies. The recognition of this fact is evinced in the very general prominence now given by our medical schools to laboratory chemical work, as an essential part of the student's education. There is certainly no lack of excellent treatises in this department of medical science, both domestic and foreign; but without depreciating others, we can aver, after a somewhat careful perusal of their contents, that the present volumes treat of the subjects described in a highly satisfactory manner.

1. The first admirable little work constitutes one of the series of manuals originally published by Cassells, of London, and which the Messrs. Lea, of this city, have so opportunely laid before the profession of our own country. It contains a succinct and graphic "account of the analysis of blood, urine, morbid products, etc., with an explanation of some of the chemical changes that occur in the body in disease."

The author is evidently master of his subject. His style is clear and unpretentious; his description of chemical processes and results perfectly intelligible to the advanced student; and his "explanations of the chemical changes that occur in the body in disease" are very suggestive to the practising physician.

Commencing with a succinct enumeration of the organic and inorganic constituents of the human body, the author proceeds to group and classify these principles under appropriate heads, such as Saccharine and Starchy Principles, Fatty Principles, Proteid Principles, Products of Metabolism, Non-nitrogenous, and Nitrogenous, and not omitting a brief mention of Ptomaines, or the alkaloids of putrefaction. The chapters on Blood and Urine are well up to our present knowledge in these departments. We notice, in passing, when treating of blood-stains, that an apparent (though doubtless unintentional) slight is put upon the *guaiacum-test* by the statement that "other substances besides blood give this (the bluing) reaction with guaiacum." This is true, but with the reservation that with blood it takes place *immediately*, whilst with other substances time is required. The description of the "Toxic Condition of the Blood" is lucid and instructive. The chapter on the urine is the fullest in the book, occupying seventy pages, but is not more copious than its importance justifies. The subject is treated in a very satisfactory manner, first chemically, and then in its pathological and clinical bearings. All the latest and best urinary tests are clearly described, so as to be easily followed by the advanced student. We notice one little lapsus in connection with the "detection of lead in urine," which is of some practical importance to the working chemist, in the direction to incinerate the extract containing the lead, "in a *platinum* or porcelain crucible;" there would be a risk (as the chemist knows) of seriously injuring the platinum by heating it with *lead*.

In the directions for "detecting mercury in the saliva," we think the author's method unnecessarily complex. We have always deemed it sufficiently satisfactory simply to employ Reinsch's test to the saliva *directly*. The mercurial deposit on the copper can readily be identified.

In the account of the *gastric juice*, the author's view is very decided

as to hydrochloric acid being the true cause of its normal acidity. For years past, it has been a vexed question whether it was due to this acid, or to lactic acid. We may regard the matter as now definitely settled. Richet has shown that in the fresh secretion, hydrochloric acid is the only one present. Lactic, acetic and butyric acids are met with "only as results of fermentive changes occurring in the stomach." In certain morbid conditions, these acids may be considerably in excess of hydrochloric acid. The author points out the practical importance of discriminating between the normal and the abnormal acids, in case of acid dyspepsia; and he gives Richet's method of distinguishing them in the vomited matters. Under this same head, some sound practical hints are given for the detection of poisons in the vomit, which any educated physician should be able to employ in an emergency, as trial tests.

In the section on *Bile*, along with a good account of the chemistry of this secretion, the author's clinical remarks on jaundice and diabetes are both valuable and suggestive.

Under the heading of the "Detection of Arsenic, Antimony, etc., in the Viscera," we are compelled to notice another chemical inadvertence on the part of the author, in the mode of employment of the excellent method of Reinsch. He recommends this process to be used on the acid mixture obtained by the previous employment of potassium chlorate on the original material; whereas (as the chemist well knows), in the latter case the liberated chlorine would indirectly prevent the arsenic or antimony from being deposited on the copper.

The last chapter treats of "Morbid Products," including urinary, biliary, and pancreatic calculi, intestinal, gouty, and other concretions, products of various degenerations, morbid exudations, and clinical remarks on scurvy, gout, and rheumatism, from a chemical standpoint. We take pleasure in recommending this manual both to the student and physician as an excellent *résumé* of clinical chemistry, and as a safe and practical guide in this most interesting department of medical study.

2. The treatise of Dr. Charles is a more elaborate production, and deals with the subject more from the physiological and pathological standpoint than from the purely clinical. The author discusses his subject under the four main heads of—I. Nutrition and Foods; II. Digestion and the Secretions concerned; III. The Chemistry of the Tissues, Organs, and remaining Secretions; IV. The Excreta, the Feces, and Urine. Under these several divisions ample scope is given for treating of various kinds of foods, nitrogenous and non-nitrogenous; describing the most approved methods of analyzing them, both qualitatively and quantitatively, with approximate reference to their physiological bearing. The chapter on "Digestion and the Secretions Concerned," are full of valuable matter, lucidly expressed and amply illustrated by appropriate experiments, most useful for the advanced student to follow in his laboratory researches. Under the head of "The Chemistry of the Tissues, etc.," the blood very naturally claims and receives a large and careful description in its chemical, physiological, and pathological relations. We have seen no better treatise on this subject since the issue of Lehman's well-known work, now becoming almost obsolete. Under this same heading, the author gives us an excellent description of muscle, nerve, milk, and the function of respiration, each subject containing the views of the latest and most approved authorities. Being himself a pupil of the distinguished Prof. Hoppe-

Seyler, he is enabled the more confidently to refer to the experiments and deductions of that celebrated teacher.

In the chapters devoted to the consideration of "The Excreta," the urine very properly receives a most thorough and careful consideration, which leaves nothing further to desire as a safe guide for the physiological and pathological student.

The last chapter contains a very useful syllabus, or guide, for the student's practical working out the various chemical and physiological processes previously discussed, which should certainly be welcomed by him as a real help in his laboratory investigations.

We entertain a high opinion of Dr. Charles's treatise, and regard it as a most useful work, not only for students of physiological chemistry, but also as being suggestive for teachers of this science. It is illustrated with a number of good engravings, and with an excellent chromo-lithograph of the blood-spectra.

J. J. R.

ART. XXXIII.—*The Elements of Pathology.* By EDWARD RINDFLEISCH, M.D., Professor of Pathological Anatomy in the University of Würzburg. *Translated from the First German Edition*, by WM. H. MERCUR, M.D. (University of Pennsylvania). Revised by JAMES TYSON, M.D., Professor of General Pathology and Morbid Anatomy in the University of Pennsylvania, etc. etc. 12mo. pp. 263. Philadelphia: P. Blakiston, Son & Co., 1884.

THE rare good judgment of the translator and reviser of this excellent work has resulted in putting into the hands of American medical students a book which has long been needed, and in a form which adds the charm of graceful diction to the substantial value of comprehensive accuracy. Indeed, when we compare this admirable translation with the rugged and obscure sentences disfiguring Professor Rindfleisch's great Text-book of Pathological Histology, when it first appeared in English dress in the original edition of 1872, we feel both that Professor Tyson and Dr. Mercur deserve the highest praise for overcoming the well-known difficulties of their task, and that the intrinsic worth of the labors of Dr. Rindfleisch must be truly great, to enable his reputation to survive the malrepresentation with which it came before the medical profession of the United States. In our opinion the modest claim made by the reviser in his generous preface that most of the well-recognized difficulties of translation have been surmounted, is most amply sustained, and his assurance that he has read every line of proof, and carefully compared all doubtful passages with the original, explains, perhaps, the exceptional clearness of the language employed, and certainly confirms our confidence in the correctness with which it conveys the genuine meaning of the Würzburg professor.

The general plan of the volume is that of considering, first, the phenomena of the local outbreak of disease under which are discussed inflammation in all its varieties, and the formation of tumors; next, the anatomical extension of disease, comprising the deuteropathic groups of symptoms, metastasis, fever, and irritation of the nervous system; then the physiological extension of disease, including the vegetative and animal disturbances, is explained at considerable length; and, lastly, a special

part is devoted to the traumatic affections, the parasitic and infectious diseases, disorders from defective development or growth, those from over-work, and those accompanying involution.

In regard to the most important question of the day in pathology, practical medicine, and hygiene, Dr. Rindfleisch declares himself an unreserved supporter of the germ theory of diseases, and devotes a score of pages to descriptions of the various fungi, which have been definitely pronounced the exclusive causes of well-known infectious maladies. Nearly all of these are grouped in the class of schizophytes, or cleft fungi, the smallest plants, and, indeed, the most minute of living creatures. Our author asserts that, although we are, as yet, only on the threshold of the science of microphytic disturbances of health, many of these pathogenetic organisms may be made distinct by using proper staining fluids and good illumination, so that we already have at command much definite information in regard to their natural history. Besides the comparatively well-known schizophytes of relapsing fever, splenic fever, and actinomycosis, the micrococcus erysipelæ, the bacillus Kochii of tuberculosis, the microphyton gonococcus found in the pus corpuscles of gonorrhœa, and the bacillus lepræ are described in detail.

In regard to the much-disputed questions of acclimation of a pathogenetic microphyte to its habitat, and *vice versa*, which bear such important relations to the doctrines of Pasteur in regard to the attenuation of virus, Professor Rindfleisch accepts as conclusive the experiments of Buchner and Nägeli, which seem to show that a certain hay fungus (the *B. subtilis*) can be gradually acclimated to the conditions of development in living human blood, where it can ultimately vegetate with all the terrible pathogenetic power of *B. anthracis*.

As this work will probably be placed upon the list of text-books on pathology in most of our well-equipped medical colleges, a second edition will no doubt be speedily called for. We would suggest that, among other slight verbal changes in the new edition, pearly should be substituted for "pearl-sized," in describing, on page 184, the vesicles of herpes; that amount would be better than "value," in speaking of such a worthless thing as functional disturbance on page 188, and that "cohabitation," in the usual meaning of the word, is more apt to cause temporary hyperæsthesia than deterioration of the sense of smell, as intimated on page 189, under the head of chemical trauma.

J. G. R.

ART. XXXIV.—*Ueber Musikalische Herzgeräusche. Nebst Bemerkungen über die Entstehung Pseudokardialen Geräusche.* Von Dr. OTTOMAR ROSENBACH, Privat-dozent an der Universität Breslau. 8vo. pp. 22. Wien, 1884.

Musical Heart Murmurs, with Remarks on the Occurrence of Pseudo-Cardial Murmurs. By Dr. OTTOMAR ROSENBACH.

THIS little brochure, No. iii. of Schnitzler's *Wiener Klinik* for last year, presents a subject little considered in the text-books in a thorough and attractive way. It is safe to say that, notwithstanding the differences in the German methods of literary treatment of scientific subjects

and our own, no one at all interested in the clinical study of diseases of the heart will begin the reading of this lecture without finishing it. Nor will those so interested be willing to be without it for future reference. It is a well-conceived and well-worked out tractate, brief as it is.

Musical murmurs in the region of the heart have always had an extreme interest for those who have encountered them, partly because of their striking acoustic characters, partly because of the obscurity of their origin, and the frequent failure of the condition of the heart after death to explain their occurrence.

Of late, this interest, as attested by numerous contributions to the subject in current medical literature, appears to have taken fresh life.

Dr. Rosenbach's conclusions are based upon clinical experience, *post-mortem* investigations, and upon experimental research. He holds that the cause and the mode of origin of musical murmurs can be best studied by avoiding the error of restricting the attention too closely to the heart itself, and by paying due regard to all the phenomena having the characters of musical murmurs that occur in the chest. Only thus can we separate the essential and the accidental factors, determine that which is the same in causation everywhere, and place the subject upon the simplest basis.

Since it may be affirmed that wherever musical murmurs of the same acoustic properties arise, the same or similar physical conditions are present, and since, further, exquisite musical murmurs are frequently produced in the veins, and, under certain conditions of disease, in the bronchial tubes, it is necessary to compare the causal conditions here existing, which have been thoroughly studied, with those of musical heart murmurs, and to regard those which are common to all as essential in the production of the musical character in the murmurs. When this has been done, and the simple mechanism by which such phenomena are caused has been cleared up, then can we, instead of enumerating a scarcely classifiable multitude of pathologico-anatomical conditions, in which musical murmurs have occurred during life, explain their occurrences in accordance with definite physical laws.

Improbable as it at first sight appears that acoustic phenomena, which seem to be simply the product of special modifications of the cardiac mechanism, and in particular of lesions of the aortic valves, may arise outside the heart, yet a little reflection will convince us, *a priori*, that such is the case.

We know that rhythmical murmurs are not only due to the blood-stream within the heart, but also to the influence exerted by the rhythmical changes of the volume of that organ upon the neighboring organs, veins, and lungs; and further, that musical murmurs are merely special acoustic modifications of ordinary blowing or humming heart murmurs; it may therefore be assumed that *musical* murmurs of cardiac rhythm also may sometimes owe their origin to the pressure of the heart upon other organs.

The author regards this as a very much more frequent cause of musical murmurs than it has been thought to be.

The conditions under which musical murmurs are produced in the lungs by respiration are well understood, as also is the mechanism of venous murmurs of various acoustic characters. From the present point of view, then, it may be possible to differentiate the groups of musical heart murmurs according to their places of origin, and to point out more exactly

the conditions under which the blood-stream within the heart produces musical murmurs.

Murmurs produced outside the heart by the reaction of the mechanism of that organ upon neighboring organs may be termed pseudo-cardial murmurs.

The most common form of musical murmurs having the cardiac rhythm, yet originating outside the heart, is that which is produced by air currents, caused by the change in shape and by the locomotion of the heart, in certain regions of the lung bordering upon the heart. Owing to the anatomical relations in the region of the apex, it is here and over the body of the heart, especially towards its left border, that murmurs of this kind are most frequent and loudest. Auscultatory signs both of health and of disease may thus have respiratory characters and cardiac rhythm in localized areas. The vesicular murmur may be heard in health, all kinds of râles in disease. The same mechanism is the cause of pulmonary murmurs having the cardiac rhythm in the region of the great vessels, the volume of which also undergoes considerable variations in systole and diastole, and a third region of predilection is that of the bifurcation of the trachea.

These murmurs may be greatly modified, sometimes even made to vanish by deep inspiration, by forced expiration, by changes in posture, and, finally, by firm pressure over the region in which they are heard; a fact not, or at all events but to a very slight degree, observed in endocardial murmurs. When such pseudo-cardial murmurs are of a musical character, they are associated, for the most part, with râles having a similar character elsewhere in the lungs.

A second group of pseudo-cardial murmurs have their origin in the veins. Here, as has long been known, musical phenomena occur which, by reason of their acoustic properties and their rhythmical character, may be easily mistaken for true heart murmurs. This error in diagnosis is the more likely to take place, because the auscultatory phenomena usually produced in the veins are not rhythmical and intermittent, but continuous. When, however, they do correspond to the heart's action, and show an intensity which varies with the force of the heart, the resemblance is very close. Especially is this true when, as occasionally happens, the murmur is transmitted without much loss of intensity to the base of the heart.

Venous murmurs of this kind are mostly simple blowing murmurs, less frequently singing or humming, and very rarely they are exquisitely musical. They are strongest during inspiration, and occur, by preference, during the systole. Diastolic venous murmurs also occur, but they are rare. They differ from endocardial murmurs occurring at the same time, as in aortic insufficiency, in that they are heard rather in the beginning of the diastole, and are never so long-drawn out as true aortic murmurs, which are the longest in duration of all the cardiac signs yielded upon auscultation. The presence or absence of hypertrophy of the left ventricle is an important differential condition in cases of doubt. These venous murmurs originate in the vena jugularis dextra, or in the vena anonyma; those having the latter seat of origin bearing in all respects the closest resemblance to true endocardial murmurs.

The discrimination of musical venous murmurs from true cardiac murmurs is easy in proportion to the distances from the heart of their seat of origin and point of greatest intensity. Of further diagnostic importance are the facts that the venous murmurs are always proportionately weaker, and have a softer quality, and that they are very apt to vary in intensity

from time to time. All influences which tend to interfere with the blood-stream in the veins, in which such murmurs are produced, either cause the murmur to vanish, or so modify it as to destroy its musical character. The horizontal posture, holding the breath, pressure, cause this effect even when the murmur originates in the innominate. Furthermore, venous murmurs are developed in most instances in anæmic subjects, and disappear with the anæmia. The author holds the view, by no means generally accepted, that the blowing systolic basic murmurs of anæmia are of venous and not of cardiac origin.

In addition to the two kinds of exocardial murmurs described, there is a third that is sometimes musical in quality, namely, the pericardial friction sound. The author's observations lead him to believe, contrary to the dictum of Skoda, that distinctly musical (whistling) pericardial friction sounds sometimes occur, hence, that pericardial friction may simulate every form of endocardial murmur.

Finally, there is the fourth category, which comprises true endocardial musical murmurs. It is probable that many cases of exocardial murmurs are clinically referred to this class.

Dr. Rosenbach doubts, on physical grounds, and believes that he has experimentally disproved, the possibility of the production of musical murmurs within the heart by abnormal or supernumerary *chordæ tendineæ*. But it is abundantly proved that such murmurs may be caused by lesions of the valves which bring about regular, clean-cut, sharply bordered openings at the ostia of the chambers of the heart, when irregular or rough deposits are absent, when the force of the blood-stream is adequate to produce a musical tone, and when the conditions are favorable to the conduction of the murmur to the ear of the auscultator. For the reason that a considerable degree of force is necessary to produce a murmur having a musical quality, these murmurs have their seat of origin most commonly at the aortic orifice, at which the force of the hypertrophied left ventricle is most directly exerted. The paper concludes with a critical study of the physical conditions under which musical murmurs arise outside of and within the body, and, considered in its entirety, constitutes an important contribution to the subject of which it treats.

J. C. W.

ART. XXXV.—*Bacteria*. By Dr. ANTOINE MAGNIN and GEORGE M. STERNBERG, M.D., F.R.M.S. 8vo. pp. xviii., 494. New York: William Wood & Co., 1884.

SOME years since, Dr. Sternberg placed us under obligation for his translation of the excellent volume of Magnin, enhanced in value by the attractive additions of his photo-micrographs. The present book is an extension rather than a revision of the former, presenting so much new matter from the pen of Dr. Sternberg that his name justly finds its place upon the title-page as joint author.

Bacteria, in its newer form, is divided into six parts. Parts first and second—Morphology and Physiology of the Bacteria—contain almost the entire matter of the older book, with but slight incidental changes in minor details, and in the omission of those subjects, which receive full

discussion later on. Since a review of this portion of the work has already appeared in these pages (April, 1881), it will be unnecessary to more than endorse the generally favorable opinion already expressed.

The remaining four parts—forming two-thirds of the volume, and treating respectively of *Technology*, *Germicides and Antiseptics*, *Bacteria in Infectious Diseases*, and *Bacteria in Surgical Lesions*—have been added by the American author. These chapters will be appreciated by two distinct classes of readers: the working biologist in search of useful suggestions and practical hints to aid his laboratory investigations; and the critical student who, without performing laborious experimentation, desires to present to himself the subject of disease germs in an intelligent, scientific, and impartial manner.

Under the heading *Technology* will be found a useful *résumé* of the various modes of procedure in the several steps incidental to this line of research. The section on *Methods of Cultivation* includes a description of culture-fluids, sterilization, culture tubes and flasks, etc. As culture-flasks, those made by the author from-glass tubing, being quite small and having a very long and delicate neck, are highly recommended, and certainly seem to possess decided advantages. Those having need of a means of obtaining a constant temperature will find useful hints for the construction of efficient thermostats in the succeeding pages. The section on *Staining Bacteria* contains the better known methods usually employed. For bacteria in general, an aqueous solution of methyl-violet—readily obtainable as violet ink—is preferred. Regarding the much-vexed question as to the most reliable method for staining the tubercle bacillus, our author contents himself with giving those usually employed, without decidedly committing himself to an expression of his opinion as to relative merits, seeming, however, himself to prefer Ehrlich's method.

In connection with *Photographing Bacteria*, the universal experience of those who have attempted this with *B. tuberculosis* is indorsed, and a convincing proof of the difficulty presented in the figures of Plate XI. Fig. 6, declared to be "the best result" obtained by so expert a manipulator, will, possibly, carry consolation to more than one, who has had but disappointment, or at best, perhaps, a shadowy, ghostly image of the bacillus to repay for hours of labor, and batches of plates exhausted in vain attempts to "catch the expression" of this grim monster. In this connection, by the way, we trust Dr. Sternberg will put to trial, if he has not already done so, the value of employing glass of a color complementary to that of the staining, somewhat after the method employed by Koch. Recently, Defrenne is said to have presented, before the Belgian Microscopical Society, photographs of this bacillus of exceptional excellence, obtained by filtering the light through green glass, the staining being fuchsin.

Part Fourth—*Germicides and Antiseptics*—is devoted to a presentation of the results of an exhaustive series of experiments with over sixty substances to determine their relative values in the rôle of germicides. A careful examination of the list, alphabetically arranged, will prove of value to every practitioner, resulting, possibly, in the abandonment of some favorite solution for one proved to be more worthy of confidence. The fact that "germicides are also antiseptics, . . . but an antiseptic is not necessarily a germicide" is worthy of general recognition. These experiments were very carefully performed, and the convenient summary will prove valuable for reference.

Part Fifth—*Bacteria in Infectious Diseases*—occupies over a third of the entire volume, and contains matter of great interest to every student of scientific medicine. After some excellent comments regarding the value of various kinds of evidence, and the methods of conducting crucial tests, the author passes in critical review the infectious diseases—those affecting the lower animals as well as man—for which a specific causal micro-organism has been described. Space forbids a detailed account of the subjects discussed; suffice it to say that a perusal of this portion of the book will demonstrate what searching scrutiny is indispensable for a correct appreciation of the value of investigations in this difficult field. For this reason, the criticisms offered by one so admirably qualified as censor as is our author, are extremely valuable as guides to those desiring to be able to form trustworthy decisions for themselves.

The final part of the volume relates to *Bacteria in Surgical Lesions*, where a summary of the opinions of many foremost in this field of observation will be found, together with notes of results derived from the author's own experiments.

The book closes with an extensive bibliography, being that formerly appended to the work of Magnin, rearranged alphabetically instead of chronologically, and rendered more complete by the addition of numerous titles of recent contributions; we notice, however, the absence of the names of several investigators, whose late prominence in the discussions regarding tuberculosis surely entitles them to a place in so comprehensive a list.

The photo-micrographs made by Dr. Sternberg are generally very satisfactory, those of bacilli and of blood being of especial excellence. While thoroughly appreciating the remarks found near the end of the preface, we trust that the intimation of a possible omission of the photographs from subsequent editions will not be carried out. In this field drawings are always unsatisfactory, and to those sufficiently interested to possess the volume, the increased cost will be more than compensated by the unimpeachable accuracy of the sun-pictures. Let the doctor cultivate the demand for greater accuracy, together with a just appreciation, by excellent photo-micrographs, rather than descend to meet the request for the time-honored diagrammatic drawing.

G. A. P.

ART. XXXVI.—*Diseases of the Brain and Spinal Cord, a Guide to their Pathology, Diagnosis, and Treatment, with an Anatomical and Physiological Introduction.* By DAVID DRUMMOND, M.A., M.D., Physician and Pathologist to the Newcastle-upon-Tyne Infirmary, Joint Lecturer on Pathology in the University of Durham College of Medicine. 8vo. pp. 374; 51 illustrations. London: Henry Kimpton, 1883.

WE think Dr. Drummond did wisely in taking the suggestion of his friends and issuing as a small volume the article on Diseases of the Brain and Cord which appeared last year in a small London Journal, *The News*, devoted to the interests of students. In its present form the work is an excellent guide to the study of diseases of the nervous system. Many of the sections are brief, but the more important affections are pretty fully

considered. The chapters on Syphilis, Intracranial Tumors, and General Paresis are very good. In the treatment of cerebral syphilis sufficient stress is not laid upon the importance of iodide of potassium, or upon the need of large doses. The section on General Paresis is written by Dr. McDowell, Superintendent of the Northumberland Asylum, and is a valuable addition to the work.

The illustrations are simply execrable, badly drawn and coarsely executed; anything worse than Figs. 2 and 42 we do not remember to have seen. Mr. Kimpton is only beginning to issue medical works, and has everything to gain by attention to details of printing and illustration, both of which he has in this instance sadly neglected.

W. O.

ART. XXXVII.—*An Experimental Investigation of the Physiological Action of Saline Cathartics.* By MATTHEW HAY, M.D. Edin., Prof. of Medical Jurisprudence and Medical Logic in the University of Aberdeen, formerly Assistant to the Professor of Materia Medica in the University of Edinburgh. With woodcuts and lithograph. 8vo., pp. 201. Edinburgh: Maclachlin & Stewart. London: Simpkin Marshall & Co., 1884.

THIS brilliant illustration of what inaugural theses may be, was originally presented at the University of Edinburgh for the doctorate, and then won for its talented author a gold medal, and also the Goodsir Memorial prize. With some alterations and additions it was subsequently published in the *Journal of Anatomy and Physiology*, and is now reprinted in book form.

Professor Hay adopts, as the point of departure for his well-conducted series of experiments upon rabbits, cats, dogs, and human beings, the question whether saline purgatives excite a flow of fluid into the intestinal canal, as asserted by Liebig, Rutherford, Vulpian, and others, or whether, as contended by Thiry and Radziejewski, the salt merely stimulates peristalsis. These observations, one hundred and twenty-two in number, lead our author to conclude that saline cathartics do provoke an increase of secretion within the alimentary canal, which is mainly poured out by the small intestine, little or none being contributed by the stomach, liver, and pancreas under ordinary circumstances. This fluid is very similar to the normal *succus entericus*, and is probably supplied in great part by the follicular glands of the intestinal mucous membrane. Increased peristalsis is not an essential factor in the purgative action produced by a saline cathartic.

In regard to the effect on the blood and circulation, which is the most important question from a practical point of view, Dr. Hay states that a saline purgative, by exciting profuse intestinal secretion, removes a large amount of liquid from the blood, which, if the salt is administered in concentrated solution, markedly reduces the total bulk of the circulating fluid. This diminution only lasts for one or two hours, as the blood speedily reimburses itself by absorbing fluid from the tissues. If the saline cathartic is given in dilute solution of five or six per cent., aqueous fluid appears to be directly absorbed from the bowel to such an extent that no concentra-

tion of blood occurs. Hence the effect of sulphate of soda, for example, dissolved to twenty times its weight of water upon the blood, and secondarily upon the tissue fluids, is totally different from that produced by a twenty per cent. solution of the same drug. The latter form of administration is, therefore, strongly indicated in the treatment of many forms of dropsy, when it is desirable to obtain a rapid and powerful reduction of the effused fluid; and our author assures us that application of this principle has already afforded the happiest results in his own practice.

J. G. R.

ART. XXXVIII.—*Recent Works on Ophthalmology.*

1. *The Refraction of the Eye. A Manual for Students.* By GUSTAVUS HARTRIDGE, F.R.C.S., Assistant Surgeon to the Royal Westminster Ophthalmic Hospital. 8vo., pp. 204. London: J. & A. Churchill, 1884.
2. *A Treatise on Ophthalmology for the General Practitioner.* By ADOLPH ALT, M.D. 8vo., pp. 244. St. Louis: J. H. Chambers & Co., 1884.
3. *The General Practitioner's Guide to Diseases and Injuries of the Eye and Eyelids.* By Louis H. Tosswill, B.A., M.B. Cantab., M.R.C.S., Surgeon to the West of England Eye Infirmary at Exeter. 8vo., pp. 147. London: J. & A. Churchill, 1884.

1. SUCH a flood of publications has in the last few years been let loose upon the "General Practitioner" for his enlightenment on the various specialities, particularly ophthalmology, that he need scarcely feel hurt that he has been omitted from the title of Mr. Hartridge's work. Perhaps, after all, he will find that this student's manual is one of the most useful of its kind, and that it contains all that is absolutely necessary to guide him in the practical clinical work which alone can give him proficiency in this branch of his profession. Without this, he will find that "studium" is little better than "somnia;" and that he may sit in his office and diligently read all the guides and manuals and aids that pour from the press, and still be hopeless of fitting himself as a practical "refractionist."

The first chapter deals with the elementary details of optics, and is very concise and clear. While it may suggest questions to the mind of the advocate of a high standard of medical education in regard to the character of the preliminary examinations in English medical schools, it cannot be denied that it may prove useful to a considerable number of aspirants for ophthalmological knowledge on this side of the ocean at least.

The second chapter commences with a brief reference to the cardinal points in the refraction of the eye, which must be utterly unintelligible to those who have no other source of information. As the reference is too brief to give any idea of the significance of these points, as little or no use is made of them afterwards, and as the statement that the "two principal focal points are situated close together in the anterior chamber" is incorrect and misleading, this part of the chapter might, perhaps, have been omitted without diminishing its value. The rest is very satisfactory

and gives a clear demonstration, well illustrated with numerous diagrams, of the different kinds of refraction, and of accommodation and convergence.

The methods of determining the errors of refraction by means of the ophthalmoscope, by the indirect and direct methods, are next discussed; and then comes a chapter in which "retinoscopy," which is evidently a favorite with the author, is treated more fully than any other subject. We cannot help thinking that it occupies more space than its practical value entitles it to. Even upon the showing of its most enthusiastic advocates, "retinoscopy" is so infinitely inferior, in convenience of application and accuracy of results, to the direct method, that it is questionable if those who are looking only for aids to practical work will be repaid for the trouble of mastering its somewhat complicated details.

The means of detecting and correcting the different forms of errors of refraction are well described, but we were rather surprised to find our old familiar acquaintance of nearly twenty years standing, Dr. John Green's clock-dial astigmatic test, attributed to Dr. Carter. Perhaps this test is now so nearly of age, and is such a universal favorite, that it can scarcely be said any longer to belong to anybody; but its paternity is unquestionable.

2. There may be a difference of opinion as to whether the time and labor of an author so favorably known as Dr. Alt are best employed in adding "one more to the long list of manuals on ophthalmology, which the last few years have produced." But his work has been well done, and his book may be said to differ, in some respects, from the other members of its numerous family. It is intended solely for the general practitioner; and the author has aimed to avoid details of subjects of little or of no use to him, and to "give him a clear idea of the principles of ophthalmology, together with so much only of its practice as he might be reasonably justified in attempting."

It is doubtful, however, whether this very desirable kind of discretion can be safely developed by an entirely superficial, or external, knowledge; and we cannot help thinking that Dr. Alt, in his desire to withhold from the reader "such information as would be likely only to lure him into dangerous paths," has made a mistake in neglecting the ophthalmoscope. While it is frequently referred to as a means of diagnosis, no directions are given for its use. The time has gone by when the ophthalmoscope can be considered the private property of specialists; and some practical knowledge of its use must form a part of the equipment of every good "all round doctor" of the future.

One of the best chapters is the first, on the anatomy of the eye. We know of no other book in which so much practical information upon this subject is so clearly conveyed in so small a space.

The numerous glimpses of pathology, scattered through the other chapters, will be found very useful to readers who have not at hand the author's excellent "lectures on the human eye."

The text is well printed, and is liberally illustrated with very good cuts.

3. Ophthalmological condensation has, perhaps, about reached its limits in Mr. Tosswill's little work. It is innocent of illustration, refraction and accommodation are entirely ignored, and ophthalmoscopy is merely referred to two or three times as a mystery beyond the ken of the general practitioner.

It can scarcely be said to fill a want very seriously felt, as it contains nothing that cannot be found in works on general surgery.

Perhaps the time is not far distant when no man with an enlightened conscience will think it safe to practise medicine, in districts remote from specialists and hospitals, until a few visits to an ophthalmic clinic have given him some familiarity at least with the external diseases of the eye. Those who have not enjoyed this advantage, and have grown "too busy to study" before they have prepared themselves for their work, may spend an evening profitably in reading this little book. It is well written, its descriptions of morbid conditions are remarkably accurate, considering their extreme brevity, and the directions for treatment are sound. G. C. H.

ART. XXXIX.—*Elements of Practical Medicine*. By ALFRED H. CARTER, M.D. Lond., Member of the Royal College of Physicians, London; Physician to the Queen's Hospital, Birmingham; Assistant Physician to the Children's Hospital, Birmingham, etc. Second edition. Crown 8vo., pp. 427. London: H. K. Lewis, 1883.

THE author of this handy little volume disclaims any attempt to compete with the larger standard works upon the Practice of Medicine, and declares that his object has been partly to provide the student with a general introduction to the study of medicine, and partly to bring the essentials of the subject, as far as required for the ordinary medical qualifications, within the grasp of those who are not disposed or have not the leisure to read the large and complete works referred to; a class of readers which Dr. Carter considers usually meets with too little sympathy. As a compendium of the practice of medicine the book is entitled to a high rank; and the fact that a second edition has been called for in less than three years shows that in London, as elsewhere, there are a great many students eagerly seeking a guide which will lead them along a royal road up the toilsome hill of learning. If those who use aids of this kind would always go on with the study in more elaborate systems of practice of physic, no valid objection could be urged against the "Essentials" and "Compendiums" so popular among the idler pupils of every medical class; but the tendency in poor humanity, unless impelled by that rare gift, a real and unquenchable thirst for the acquisition of knowledge, to rest satisfied with knowing just enough to "get through" is naturally so powerful, that we doubt the propriety of encouraging it by any artificial stimulus of this type. Still it must be admitted that any one who has stored away in his memory all the contents of this work will be better informed respecting diseases and their treatment than a majority of the practising physicians of the present day. Being fully up to the times, and containing a condensed list of prescriptions found useful by the author in all the more common maladies, the volume on account of its convenient size might be of great service to practitioners in rural districts, who frequently desire to glance over the opinions of a recent authority, regarding some obscure or puzzling case, whilst actually on the road to visit it. Under these circumstances this excellent little work of Dr. Carter's may prove the best substitute for a consultation with some famous London physician, available, and as such we warmly recommend it to our readers. J. G. R.

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

Experimental Researches on the Biliary Secretion.

Dr. D. BALDI has recently undertaken a series of experiments on the process of secretion of the bile in the laboratory of M. Luciani, of Florence, in which he has endeavored to ascertain whether it takes place in a uniform manner in accordance with the presence or absence of food in the alimentary canal, and whether it varies materially with the nature of the food. The results are given in the third volume of the *Archives Italiennes de Biologie*. A biliary fistula was first made, the ductus communis choledochus being ligatured so that no bile entered the duodenum. Dr. Baldi found that there was a singular irregularity in the quantity of the secretion formed, distinguishing the function of the liver from all other digestive secreting organs. Not only was there great variation in the absolute quantity secreted, but the composition of the bile differed remarkably at different periods after a meal. Speaking broadly, in an animal that has been supplied with food, there is an augmentation in the total quantity of bile secreted in the course of some hours, as compared with the quantity secreted in the course of some hours, as compared with the quantity secreted in the same time by the animal when fasting. It is not possible, however, to fix the time at which the secretion of bile after food is at its maximum; indeed, it is even possible that the maximum may be attained during some one hour when the animal is fasting. Different kinds of food, starches, proteids, fats, and mixed foods, have no appreciable effect on the quantity or quality of the bile. If we consider, in addition, that, unlike the other secretions which are poured into the intestinal tract, the bile continues to be secreted in prolonged fasting, as has been demonstrated by various experiments, we shall be led to the conclusion that this fluid, from a physiological point of view, has more analogy with urine than with the other digestive fluids. In a second series of researches, in which the effects of reputed cholagogue drugs were investigated, Dr. Baldi is not in accord with either Röhrig or with Rutherford. Röhrig found that colocynth was the most active cholagogue; then, in succession, jalap, aloes, senna, and rhubarb. Rutherford considered the order to be—podophyllin, rhubarb, aloes, colocynth, senna, and other drugs. Baldi experimented with podophyllin, rhubarb, jalap, sodium, phosphate, pilocarpine, and Carlsbad water, and from his results, feels inclined to

doubt altogether the cholagogue value of all these substances. He admits, however, that the presence of a biliary fistula seriously interferes with the action of remedies. Dr. Baldi undertook still another series of experiments, to determine whether bile injected into the blood was excreted by the liver. The animal employed was a dog. The bile injected was that of the ox, deprived of mucus. Dog bile is brown; ox bile green. Almost immediately after the injection of ox bile the color of the bile secreted by the dog became green.—*Lancet*, November 29, 1884.

Modifications of the Blood during Pregnancy.

COHNSTEIN, in an article on this subject in *Pflüger's Archiv*, Bd. xxiv., Heft 3 and 4, 1884, says that up to the present time authors have not been absolutely in accord as to the modifications which take place in the blood during pregnancy. He made a series of experiments on pregnant and non-pregnant ewes, using the apparatus of Hayem and Malassez, modified by Zeif. In the pregnant animals he found a minimum of 8,305,555, a maximum of 10,300,000, a mean of 9,742,222 red corpuscles per cubic centimetre. With this diminution of the red disks in pregnant animals, we would naturally expect a diminution in the percentage of hæmoglobine; but experiments showed that such was not the case. In the pregnant animals the percentage was 7.8; in non-pregnant, 5.5. The percentage, then, is larger in the pregnant state, as is the size of the red globules; thus the smaller number is largely compensated.—*Archives de Toccol.*, November, 1884.

MATERIA MEDICA AND THERAPEUTICS.

Gastro-Intestinal Therapeutics.

In a recent lecture on this subject, Prof. DUJARDIN-BEAUMETZ calls attention to the more recent gastro-intestinal medications, the application of electricity to the treatment of affections of the stomach and intestines, enteroclimism and alimentary enemata.

The application of electricity to the treatment of gastro-intestinal affections is much more extensive now than a few years ago; it may be studied in its applicability to diseases of the stomach, and to those of the intestines. In persistent vomiting and in acute gastralgie pains it is used by Apostoli, who has continued the experiments made by Prof. Semmola in 1861, with continuous currents. He used in these cases what he calls positive polar galvanism of one of the pneumo-gastrics. It is carried out in the following manner: The positive electrode is placed external to the sternal end of the clavicle, on a level with the upper surface of the bone, just at the point marked by the depression between the clavicular insertions of the sterno-mastoid muscle. This electrode is made of a piece of carbon covered with chamois skin, the skin being moistened; the other electrode is a roller which the patient holds in his hand. A continuous current is then furnished by a Gaiffe or Trouvé battery. The quantity varies between five and fifteen milli-ampères, and should be such that the epigastric pain disappears under its influence; the current being continued until all painful or spasmodic phenomena disappear, this requiring from ten to twenty minutes, or longer. For vomiting, Dr. Apostoli recommends that the galvanism be commenced while the stomach is empty; the patient should then eat something during the galvani-

zation, which is kept up until every symptom of vomiting has disappeared. Dujardin-Beaumetz has often used this method, and has had excellent results in some cases, especially in that state so well described by Lucien Denian, in his *Thèse* on gastric hysteria. The procedure is not dangerous, is not complicated, and may be used without any inconvenience.

Another procedure, which requires much more care, is the internal application of electricity to the stomach. Fürstner and Neffel, Macaris and Bonnefin have already used induced and feeble intermittent currents for causing contractions of the stomach. Perli, in 1879, used the induced current in the stomach, using as a conductor an œsophageal sound, and recommended this faradization in the treatment of dilatation and chronic catarrh of the stomach. Bocci also, in 1881, repeated the experiments of Perli, always with the faradic current; and Dr. Bardet, who has recently written an excellent book on medical electricity, uses the continuous current, and practises direct galvanization of the stomach. The instrument used by him consists of a stomach siphon, in which an electrode, terminating in a carbon olive-shaped bulb, is carried to the stomach. The bulbous end of the electrode never passes beyond the extremity of the sound, and should not come directly in contact with the mucous membrane of the stomach. The sound is first introduced without the electrode, and then, when it was fairly passed into the stomach, the electrode is passed in. A funnel-tube being connected with the sound, the stomach is filled with water, after which one electrode is placed in the patient's hand or on his stomach, the other being fixed to the upper extremity of the conductor passing into the stomach. The current used in these cases will, of course, vary according to the indications to be fulfilled; in cases of dilatation of the stomach, when it is desired to cause contractions of the muscular coats, the negative pole should be introduced into the stomach, and the slow, interrupted galvanic current used; to regulate the interruptions, a GaiFFE's metronome is used. If it be desired to control vomiting, the positive pole is carried into the stomach and only continuous currents are used. But whether the positive or negative pole be used in the stomach, it is always through the medium of the water that the current acts upon the walls of the stomach. The intensity of the current varies from fifteen to twenty milli-amperes.

Very excellent effects have been obtained in cases of intestinal occlusion by internal use of electricity. First used in 1826, by Leroy d'Etiolles, under the form of faradization, it has given excellent results in the treatment of internal strangulation, notably in the hands of Bucquoy, in 1878; and still more recently Boudet has placed the method on a sound basis. He uses galvanism, having a rectal excitator in which is an electrode which never comes in contact with the intestinal mucous membrane. The negative pole should be introduced into the intestine, the positive pole being placed on the abdominal wall. The current should be of feeble intensity, not more than ten or fifteen milli-amperes. The operator should be careful, from time to time, to interrupt the continuous current by pressing on the interrupter of the apparatus. There should be from three to four sésances a day, as may be necessary, and each one should last twenty or thirty minutes. Dr. Bardet has modified the rectal excitator, and in view of the good results which Dujardin-Beaumetz has obtained with Debove's tube, he has utilized the same for intestinal galvanization. It is especially in cases of ileus or volvulus, or in the pseudo-strangulations due to paralysis of the muscular fibres of the intestine, that electricity gives the best results, though it is absolutely of no value in cases of compression of the intestine by tumors, or of strangulation by peritoneal bands.

In cases of strangulation by compression of the intestine or by degeneration of the viscus, we may employ a method recommended by Cantani, of Naples, to

which he has given the name *enteroclism*. The apparatus for performing enteroclism is extremely simple, and consists of a reservoir furnished with a plug corresponding to a caoutchouc tube with a canula, which is carried into the intestine, and a more or less intense current is set up in the gut according to the height to which the reservoir is carried. Cantani has shown that certain bodies, oil among others, may be made to penetrate not only the large intestine, but even into the small, and so far up that the oil will be vomited. He applies his method not only to strangulations, but also to the dressing of affections of the intestinal mucous membrane; and Dominicis, Paolucci, Pera, Perli, and more recently Muselli, have shown that this method has great advantages. Dujardin-Beaumetz has shown that the Debove tube is the best enterocliseur, as it may be carried high up into the intestine by reason of its suppleness; and by the aid of the siphon the intensity of the current may be varied at will. The tube for this use should have an aperture relatively small, so as to give greater force to the jet. The question of alimentary enemata is now quite definitely determined. Albertoni, Garland, Czerny, and others have shown that the large intestine and its lower extremity have no digestive properties, they can only absorb. It is necessary, therefore, as has been shown by Dujardin-Beaumetz and Chevalier, that the enemata, to be nourishing, should contain peptonized substances, and this is one of the most useful applications of peptones. The peptones now on the market are both solid and liquid; the dry are much to be preferred to the liquid. The enemata should be carried as high as possible into the intestine, by means of the Debove tube or one of the enterocliseurs. The rectum should always be thoroughly washed out before the enema is administered. The composition of the clyster should be about as follows: the yolk of one egg, two dessertspoonfuls of dry peptones, five drops of laudanum; if the peptones be acid, add about gr. viij of bicarbonate of soda. If liquid peptones be used, the quantity should be two tablespoonfuls; and the enemata are given morning and evening. Catillon and Darember have shown that this method of feeding may be continued for a month without irritating the rectum.—*Bull. Générale de Thérapeutique*, Nov. 15, 1884.

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The Difference in the Therapeutic Effect of Electric Currents, and the Electro-Diagnostic Exploration of the Visual Field.

In an exhaustive article on this subject, Dr. C. ENGELSKJÖN, of Christiania, draws the following conclusions:—

1. Experiments on patients suffering from vascular neuroses have shown that, in the local application to the skin of the subject, with the use of the electric bath, the two kinds of electric current exercise an inverse effect on the vessels; whilst the faradic current dilates the spasmodically constricted vessels, the galvanic current constricts the actively dilated vessels. In conformity with this difference in action, the faradic current at the same time produces an increased, the galvanic a lowered, temperature. There seems to be no difference as to the action of the two poles of the galvanic battery.

2. The central application of electricity enables one to see, in analogous cases of cutaneous vascular neuroses, a difference in effect between the two kinds of current, so that, in certain given cases, the cure may only be due to one of them, either the faradic or the galvanic.

3. Comparative experiments on patients suffering from hemicrania and other central neuroses have also shown that the galvanic current acts contrary to the faradic, from a therapeutic point of view; whilst only one of the currents, the positive, produces a cure in a given case, the other (negative) aggravates the disease. The difference in the effect of the two currents on the subjective symp-

toms is, in most cases, seen instantly, and is very striking. It is possible to neutralize the effects of one by the other.

4. As in the central neuroses, electricity acts in the same manner as in hemiparesis, so that in certain cases the galvanic current alone, and in others the faradic current alone exercises a happy effect; whilst the treatment by the negative current has an injurious action, these neuroses appear, in analogy with hemiparesis, to be of a dualistic nature.

5. The neurotic diseases of the ganglia of the great sympathetic, such as stenocardia, cardialgia, etc., behave, as regards electric currents, in the same manner as diseases of the central nervous system.

6. Engelskjön has also seen cases certainly related, by reason of their symptomatology, to diseases accompanied by evident anatomical alterations of the central organs, and which do not behave in the least as neuroses with electric currents, though they are promptly cured by electric treatment.

7. It is more than probable that the peculiar nature of the etiological factors exerts a determining influence on the future form of a particular case, and that consequently the recognition of the etiological relations in a given case enables us to make a choice of the two kinds of currents.

8. The diseased state of the spinal ganglia may act in a reflex manner on the spinal cord, and give rise to spinal symptoms. In the same manner the diseased condition of the cord is, as is well known, capable of exerting a reflex action on the brain, and of causing cerebral symptoms. The progress of the reflex action is always from below upwards. In this connection it was observed that the organ secondarily attacked should almost always be treated by a current different from that used on the organ primarily diseased.

9. Engelskjön treated cerebral symptoms by electrization of the medulla oblongata, one of the electrodes being placed in the nuchal fossa, the other above the larynx. The spinal symptoms may be treated simply by conducting the current across the lower part of the cervical portion of the cord.

10. The well-known increase of the morbid symptoms, caused by a long use of electricity, is due to the effect of the current on the healthy ganglionic cells.

11. Electrization of the brain, the spinal cord, the ganglia, and the skin exerts a powerful influence on the functions of the retina; so much, that in certain given cases, the positive current extends the visual field, and often increases, at the same time, the activity of vision. As these effects may be said to be direct, we may use electricity in exploring the visual field.

12. If one will submit his hands and forearms to the action of warm or cold water for a few minutes, the cold water will be found to produce, in special cases, the same effect on the visual field as the galvanic current, whilst the effect of warm water is the same as that of the induced current.

13. In this general action on the skin, cold and warm water exert, in such cases of a given disease, the same therapeutic effects as the galvanic and the faradic currents employed separately. The effects of cold water are similar to those of galvanism, those of warm water to those of the induction current. If one will only recognize the kind of current suited to a special case, he is in a position to indicate the proper balneo-therapeutic treatment. And conversely, the good or bad effects of cold or warm water will serve to indicate the proper electric treatment.

14. There are cases of nervous disease which, though generally amenable to electric treatment, can only be cured by central electrization, and grow worse under the influence of one or the other of the two kinds of currents. It is sometimes possible to cure certain cases in another manner, by electrization of the skin. Used in this way, electricity seems to act in two different ways: 1, by

acting on the skin itself; 2, by acting on the peripheral nerves. The two kinds of currents act inversely in the first case, though not in the second.

15. In using the two kinds of currents on the peripheral nervous circuits in cases of neuralgia, Engelskjön has never seen any qualitative difference in their therapeutic activity.—*Nordiskt Medicinskt Arkiv*, Bd. xvi., Hft. 4.

Double or Bipolar Uterine Faradization.

In *L'Union Médicale* for October 28 and November 1, 1884, Dr. G. APOSTOLI has an article on this subject, the first portion of his article being mainly concerned with his theories as to the value and applicability of bipolar faradization of the uterus, the following being a summary of the reasons why it is preferable to the unipolar method: (1) The cutaneous pole is suppressed, and the uterus gets the full benefit of the whole electric current. (2) The operation is much more easily performed, requiring no assistant. (3) The pain is lessened by the removal of all electric influence from the cutaneous surface. (4) Generalization is more easy by this method, by reason of the ease with which it is carried out, and hence the execution is more complete. (5) It is by far more efficacious, possibly on account of the increase of the uterine contractility and the use of a stronger current, more intense and more active; is therefore much easier and less harmful.¹

Clinical experience has fully justified the theoretical claims for this method. Patients upon whom both methods have been used much prefer the bipolar application; and, contrary to what is seen with the unipolar method, the pain is of little moment, and it actually appears to be beneficial in cases of metritis.

The difference between the contraction of smooth and striated muscular fibres is well known; one is active and immediate, the other often slow and sluggish. The contractions of the non-gravid uterus have given rise to much discussion and contradiction. The variability of the contraction from the point of view of time and intensity is indisputable; in one woman several minutes may elapse before it occurs, in another it takes place almost immediately. The same difference is seen as regards force and intensity. This is a clinical fact. Experiments on animals have demonstrated another important fact, that this contraction rarely takes place *en masse* in striated muscular fibres; it takes place progressively, being first localized at the point of application of the electricity, and then radiates more or less rapidly, according to the intensity of the current, through the whole organ. Can we not conclude, from this fact, that in the woman an increase in the number of points of application will increase the action of the electric current, and that by placing both poles in the uterus the maximum action will be obtained from any given current? Clinical experience also justifies this conclusion as regards the human subject; the procedure is less painful and more active.

As regards the pain, it should be noted there is a marked difference in electric sensibility between the body and cervix of the uterus; a fact not hitherto pointed out. The cervix is by far the more sensitive of the two portions; and to obtain the minimum amount of pain with the maximum effect, the electric sound should be carried completely into the cavity of the uterus. In this way the intensity of the current may be twice as great as by the unipolar method. In Tripier's procedure (the unipolar) the medium quantity of faradization is the induction obtained by the sheathing of half the bobbin of his apparatus. A woman will very rarely support the maximum, and here we must understand always the maximum of the bobbin with a large short thread or the *quantity current*, the

¹ Cuts of the instrument may be seen in *L'Union Médicale*, No. 153, Oct. 28, 1884.

only one used in the treatment of metritis. The indications for and tolerance of the *fine thread* bobbin are entirely different. In Apostoli's method the inverse is true; the maximum is often obtained, and it is only rarely, especially when the sound is in contact with both the cervix and body of the uterus, that a medium current is sufficient.

Should we increase the intensity of the current and force the quantity of the induced current? It may be answered that, if uterine faradization has failed in the cure of metritis, it is because the current was too feeble. To increase the action Apostoli has made several models of his electric sound, of different sizes and with the poles at varying distances apart. With this instrument even pregnancy is not a contraindication to the use of electricity. Very great care must be given to the position of the sound in case of pregnancy. It should *not* be carried *beyond* the internal os, but should be left in the cervix, and held there firmly with the hand, the index finger being in the vagina and against the posterior lip of the cervix. In some cases of very pronounced flexion, when the uterus is in an inflamed state and every movement is painful, it is prudent not to attempt to carry the sound into the uterine cavity. The general and absolute rule is that *no violent movement of any kind may be made*; faradization in these cases is only a sort of therapeutic hysterometre, and will give no good results if violence be used.

The sound should always be introduced without the speculum, and carried along the palmar surface of the index finger, should be carried in slowly, *without effort*, and arrested as soon as it comes in contact with any obstacle. In the treatment of metritis, and in the many indications after parturition, there is a large field of usefulness for the bipolar method.—*L'Union Méd.*, Oct. 28 and Nov. 1, 1884.

Electro-Therapeutics.

DR. A. HUGHES BENNETT, in an introduction to a discussion on this subject in the Section of Pharmacology and Therapeutics at the fifty-second Annual Meeting of the British Medical Association, enumerates some of the chief morbid conditions for the treatment of which electricity is believed to be specially suitable. These, for practical purposes, may be considered under three classes: (1) diseases characterized by diminished functional activity; (2) those by increased functional activity; and (3) a large and miscellaneous collection of affections associated with local and general malnutrition. Under the first heading may be placed paralysis, anæsthesia, atrophy, sclerosis, and a variety of other morbid states. The etiology of these conditions is often obscure. The indication for their treatment is to excite and stimulate, to exalt functional activity, to remove anything which inhibits conduction, to overcome obstruction, and to modify abnormal nutrition-changes. The casual as well as the symptomatic manifestations must be brought under the influence of the current; and, in paralysis or anæsthesia, not only must the secondary local effects be treated, but the primary central lesions which caused them must be beneficially modified. Should any obstruction to natural impulses exist at any portion of the nerve-tract, this may often be successfully overcome by an electric stimulus, which thus artificially paves the way for subsequent normal impressions, and the consequent repetition of which ultimately ends in the transmissions of the healthy functions. Here, also, attempts are made to stimulate depressed functions into normal activity; and, by utilizing the catalytic properties of the current, in modifying nutrition, and influencing the trophic elements of the tissues, to facilitate the absorption of morbid products, and to promote the return of healthy structure. On these principles, there is obviously

a large series of symptoms and diseases capable of being rationally submitted to the electric current, and it is probable that many of them receive more benefit from this method of treatment than from any other.

In the class of disorders characterized by excessive functional activity, there are pain, spasm, contracture, and their allied affections. Here, also, we are generally ignorant of the seat and nature of the primary lesion; but we assume the symptoms to be due to some molecular, or, so-called, functional derangement, the objective existence of which, however, we are unable to demonstrate. But, whatever may be the cause, the special property of the electric current, applied in a certain manner, is to relieve motor and sensory superexcitability, not only at the time of application, but often permanently afterwards; and, if this influence be maintained, the nutrition is so modified as to result in the entire removal of the disease itself. These sedative and alterative effects of the electric current obviously suggest its employment in a vast variety of morbid conditions.

Finally, the tonic, modifying, or catalytic actions of electricity may be employed in many local and general diseases. As has been already stated, the effects are supposed to be due to the influence the current exercises on the nutrition of the tissues, the modification of the trophic functions, the alteration in the circulation, and the stimulation of the absorptive processes. Of the exact nature of these actions we know nothing, and we are equally ignorant of the precise pathological conditions for which they are applied; and practical experience alone indicates their utility. Hence electricity has, with advantage, been employed in local ailments, as in rheumatism, gout, joint-affections, skin-diseases, chronic inflammations, and so on. So, also, in more general maladies, on the same principles, it has been found beneficial, as in hysteria, neurasthenia, chorea, general debility, and a variety of other miscellaneous constitutional disorders. It is especially among the neuroses, and so-called functional derangements, in other words, in those diseases characterized by much suffering and distress, without demonstrable tissue-change to account for them, that the greatest triumphs of electrical treatment are to be found.

Although these are the general conclusions which have been arrived at as to the utility of electricity as a therapeutic agent, much yet remains to be accomplished in this direction, and a vast field for future research and discovery still lies open for cultivation. For the solution of the complex problems involved, an accumulation of facts, observed and recorded with the most rigid accuracy and impartiality, is demanded. Instead of electro-therapeutic investigations being conducted, as is too frequently the case, by those ignorant of the elements of the science, and registered by them in an imperfect, illogical, and unscientific manner, the question requires for its truthful elucidation an extensive technical knowledge, dexterity and precision in the management and recording of details, and the absence of prejudicial opinions or interested motives. Doubtless, any one adopting this line of inquiry in such a scientific spirit would be rewarded by novel and important results.—*Brit. Med. Journ.*, Nov. 22, 1884.

MEDICINE.

Examination of the Blood for the Diagnosis of Acute Diseases.

In a communication to the Société Française pour l'Avancement de la Science, M. HAYEM says that most valuable work has been done in the past

few years in the examination of the blood as a means of diagnosis of acute diseases; this study has only been made, however, by chemical procedures, and there is still wanting a practical method for exact diagnosis. There is in general pathology a vast field for what may be called the "Semeiology of the blood as regards the prognosis and diagnosis of diseases." Microscopic examination of the blood is difficult, on account of the excessive vulnerability of its elements; desiccation and evaporation change their form, and interfere with their examination.

Hayem has made an instrument which, notwithstanding its simplicity, has not been used by physicians, though he has used it for two years. He has made a small central disk in a plate of glass, by hollowing out a circular trench three millimetres in diameter. After having plastered vaseline on the part of the plate immediately outside of the trench, a drop of blood is placed on the disk and a small plate is placed over it and fixed. The drop of blood spreads uniformly under the plate and makes a layer of some thickness under the little disk, completely protected from evaporation and from the air. After having acquired a certain skill in this method, one makes all the preparations alike. This procedure has an immense advantage in showing the blood as it is in the vessels; the process of coagulation may be studied with the microscope, and the quantity of fibrin in the blood is easily appreciated. When normal blood is examined in this way it seems to contain only a very few and very short filaments of fibrin; in pathological cases it contains a thick fibrinous reticulum under certain circumstances. The amount of fibrin may be measured from the beginning to the end of a disease. Take, for example, an acute febrile disease, at its onset; at this time the diagnosis is difficult, but if there is not an abundant reticulum of fibrin one may almost certainly diagnosticate a pyrexial disease. This method is very useful in facilitating the diagnosis in difficult cases, as, for example, certain anomalous forms of intermittent fever. Suppose now that a patient gives general evidences of pyrexia at the beginning; if there is no fibrinous reticulum, the case is almost certainly one of typhoid fever; if the reticulum is thick typhoid fever may be thrown out of the diagnosis, as may such inflammatory complications as pneumonia or pleurisy. There is an affection which so closely resembles typhoid fever that it is often mistaken for it; mucous fever, gastric fever, or inflammatory fever, as it is called. In these cases there is a constant increase in the amount of fibrin in the blood, contrary to what is seen in typhoid fever. There are a certain number of exceptions; some of the inflammatory diseases of the phlegmasiæ are not attended by an increase in the amount of fibrin. Such are certain forms of pneumonia, as what has been called typhoid pneumonia, pneumo-typhus. If there is a slight reticulum of fibrin, somewhat greater than the normal, it is no longer a typhoid pneumonia, but a tuberculous pneumonia, a caseous lobar pneumonia. The phlegmasiæ, the types of which are gout, rheumatism, and frank pneumonia, may be always recognized by their augmentation of fibrin, even in the apyretic forms of gout and rheumatism.—*Revue Méd. Franç. et Étrang.*, Nov. 1, 1884.

Pernicious Anæmia in a Child Five Years Old.

Dr. ADOLPHE KJELLBERG opens a paper in which he gives the history of this case, by stating that pernicious anæmia is of greater extent than was believed at the time when Biermer called attention to it by his description of the disease; that it is chiefly seen at mature age; that it runs even up to the period of old age; but that, so far as childhood is concerned, only one case has been thus far reported—that of a child 11 years old, by Quinke. After having mentioned the

principal symptoms of this case, Kjellberg gives the history of a case which came under his own care, the patient being only 5 years of age. It was especially remarkable for its rapid course, and very characteristic symptoms, such as discoloration of the skin, which became of a yellowish waxy color, pallor of the lips, great prostration, asthma on the least exertion, palpitations, intense anæmic bruit, retinal hemorrhages, watery-looking blood, and reduction of the number of red disks to 0.571 million per cubic millimetre. The *post-mortem* appearances were also very characteristic; extensive fatty degeneration of muscular structure of the heart, excessive pallor of the cerebral substance, hemorrhages of the cerebellum, pericardium, pleura, lungs, and peritoneum, and fatty degeneration of the epithelium of the renal tubules.

From the knowledge gained from Quinke's case and his own, Kjellberg concludes that pernicious anæmia presents the same symptomatology in childhood as in adult life.

This case throws but little light on the etiology of pernicious anæmia; and gives no ground for the hypothesis that this disease is the result of a life of privation and of insufficient nutrition, for this child was in comparatively good circumstances. Kjellberg is rather inclined to indorse the opinion of Warfringe that pernicious anæmia should be considered as an infectious disease. His patient was put on arsenic, with nourishing food, but with no noticeable result.—*Nordiskt Medicinskt Arkiv*, Bd. xvi. Hft. 13.

The Nature of Fever, and the Cold-Water Treatment of Fever.

B. NAUNYN has recently contributed an article on this subject to the *Archiv für Experim. Pathol. und Pharmacie*, Bd. xviii., Hft. 1 u. 2. In this article he calls especial attention to the experiments of Liebermeister and Jürgensen, which, in spite of their one-sided character, have received very general recognition. Naunyn draws a sharp line of separation in fever as to the danger of increased temperature, and the severity of the disease causing it, of which fever is only a symptom. He has experimentally studied the dangers of over-heating the organism, where there is no general disease, by placing rabbits in a specially constructed apparatus. The result of these experiments was that completely healthy normal rabbits bore a temperature of 107.6° Fahr. for from one day to one week, and for the most part without injury; but that a temperature of 108.5° or 109.4° Fahr. was dangerous and fatal. He leaves out of his discussion, insolation and intense hyperpyrexia, for which he advises prompt treatment with cold water.

In discussing the febrile diseases, pneumonia, typhoid fever, relapsing fever, scarlatina, etc., he concludes that the high temperature is absolutely of no moment as an element of danger. A very clear example is seen in relapsing fever in which, as is well known, high temperature is the rule, reaching a degree seldom seen in other diseases, and which may persist for a long time without injury to the patient, but not usually considered dangerous by physicians. So also in typhoid fever in which low temperatures are observed (seldom over 102.2° Fahr.), but which are accompanied by severe general disturbances, the patient recovering more slowly and with more difficulty than from cases which are similar except as regards the presence of higher temperature. The same is seen in other acute febrile diseases. Naunyn thinks, therefore, that observations as to the temperature in febrile diseases are of more importance as a rule than of any other single symptom, especially since we have no such certain means of measuring other symptoms as by the thermometer in abnormal temperature.

Naunyn cannot regard Liebermeister's definition of temperature as correct.

We have no right, he thinks, to regard the functional disturbances which take place in single organs during fever, as the consequence of the fever. Fever is a symptom, with which the other pathological phenomena, as disturbances of the nervous system, of the circulatory apparatus and of nutritive changes, occur as coördinate symptoms, and the occurrence of all these single symptoms is the acute affection.

He has also made extensive researches in the acute infectious diseases as to the nutritive changes, the changes of the blood in fever, the circulatory disturbances, and those of the organs of secretion. In these he was assisted by Dr. MINKOWSKI, who, in examining the blood of fevered dogs, found no constant changes in the blood disks. But he found in the same blood an abnormal acid—fermentable lactic acid. Naunyn also made experiments on the excretion of urine and on the occasional presence of carbonate of ammonium in fevered persons. In one case of petechial typhus, he found, on the second day after the crisis, ninety-one grams of urea, and in a second case, on the third and fourth days after the commencement of the fever, one hundred and sixty grams. Nothing conclusive was found as to the presence of carbonate of ammonia in the blood.

After discussing the nature of the febrile process, Naunyn develops the grounds upon which he recommends the hydiatic treatment of fever, and the rules by which one should be guided. He restricts the cold-water treatment (except in cases of insolation and intense hyperpyrexia) entirely to typhoid fever, as statistics have not yet shown that it has a favorable influence upon the course of other acute febrile diseases. But other antipyretics, as salicylate of soda and quinine, never act so well in typhoid fever as the cold-water treatment. The rules which he gives for this treatment, in the course of typhoid fever, are mainly as follows: He prescribes complete baths only, dividing them into: 1, cold baths, between 72.5° and 81.5° Fahr.; 2, lukewarm, between 81.5° and 90.5° Fahr.; 3, warm baths, between 90.5° and 95° Fahr. Typhoid fever patients should be placed in the bath, as a rule, as soon as the temperature in the axilla reaches 103.1° Fahr. The frequency of the baths should depend upon the temperature of the patient. The temperature should be taken every three hours, and a bath given. Baths of 77° Fahr. are most frequently used at first, and then of 83.2° or 86° Fahr., but never under 72.5°. The patients should be bathed at night as well as during the day. The cold bath should last from five to ten minutes, the lukewarm from ten to fifteen, according to the susceptibility of the patient. After the bath warm wine or grog should be given. If baths at these temperatures have no favorable effect, and the patient cannot be warmed and shows symptoms of collapse, the bath should be 4° or 5° higher. If the temperature does not fall sufficiently with baths at this temperature, or if it soon rises again after the bath, the water may be made somewhat cooler, or the patient may be bathed oftener, and before the temperature reaches 103.1° Fahr.

In severe cases of typhoid fever, with low temperature and pronounced general symptoms, the patient may be bathed with advantage if the axillary temperature reaches 102.2°. In some cases also, cases of violent delirium, warm baths may be given between the cold ones, generally in the afternoon between 6 and 8 P. M. The influence of these warm baths is, as a rule, very good. In connection with the bath-treatment, Naunyn places great reliance upon a careful dietary regimen.—*Centralt. für klin. Med.*, Sept. 13, 1884.

An Analysis of Cases of Diphtheria.

At a recent meeting of the Berlin Medical Society, Dr. HENOSCH read a paper on diphtheria, as observed in the Charité Hospital in the years 1882 and 1883,

the full text of which is to be published in the next "Charité-Annalen." Exclusive of doubtful cases of angina, so-called scarlatinal diphtheria, and idiopathic croup, no fewer than 319 cases of the disease were observed; 216 of these were between the ages of two and six years. The mortality was very high—viz., 208—particularly in the first three years of life, for only 17 out of 118 attacked in this period recovered. This high mortality was ascribed partly to the "genius epidemicus," partly to the unsanitary surroundings of the sick, and to the fact that many of them were tuberculous and of the lowest class. In 145 cases the larynx was implicated, and 129 of these succumbed; of the remaining 174 cases, 79 died. Tracheotomy was performed in 138 cases, with only 16 recoveries—i. e., $11\frac{1}{2}$ per cent.; but 17 of these deaths were due to the supervention of scarlet fever. Of 66 cases tracheotomized in the first three years of life only 2 survived; death being almost invariably due to croupous bronchitis or bronchopneumonia; but occasionally to erysipelas of the wound and diphtheritic collapse. On an average the greatest danger to life was from the second to the fourth day after the operation. Speaking of the associated conditions and symptoms, Dr. Henoch said that, scarlatinal cases excluded, cutaneous eruptions were rare. In three cases a diffuse ulticaria-like erythema was noted over the nates and extensor surfaces of the extremities. Swelling of the submaxillary glands was constantly observed; but except in highly malignant cases it did not pass on to suppuration. In no case—except one doubtful scarlatinal one—was there swelling of joints; nor endocarditis, which was never found post-mortem. Albuminuria was most common, and if it reached an amount of about one-third or more was regarded as of bad prognostic significance; for in such a case it indicated either intense blood-poisoning or nephritis, which *per se* was an element of danger even after the diphtheria had passed away. Dropsy, however, rarely occurred, and uræmic symptoms were never observed. This nephritis, which could hardly be considered a true sequel, was frequently associated with cardiac debility, the occurrence of inflammations, and diphtherial paralyses. The use of corrosive sublimate as a gargle, of arsenic and iron, and of papayotin in serious cases, was advocated.—*Lancet*, Nov. 29, 1884.

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The Symptoms of Rickets considered in relation to their Anatomical Origin.

M. KASSOWITZ, in an article in the *Jahrbuch für Kinderheilkunde*, Bd. xxii. p. 60, says that the most striking feature in the microscopic anatomy of rickets is the hyperæmia and increased vascularity of all the tissues, and especially of those in which the growth of the young bone is going on. It is to be seen in marrow, cartilage, and periosteum, as well as in the bone itself. Indeed, a new formation of bloodvessels takes place, and vessels are to be found in places where normally there are none. This increased vascularity must be considered the primary lesion out of which all the others arise. It acts in two ways: firstly, it disturbs the course of development of the growing bone; and, secondly, it sets up unhealthy processes within bone already formed. In the growing bone excess of nutritive material causes excessive proliferation of cartilage cells, and a consequent loss of firmness in the cartilaginous tissue: the cells are increased in size and number, and the matrix is also more abundant and softer than usual. There is also an increase, in the earlier stages of rickets, of the area of ossification; but the bone thus formed does not become thoroughly firm, because the involution of the vessels, which is a necessary process in the formation of healthy bone, does not take place. The result is a loosely-formed bony tissue wanting in compactness and solidity. In the bone already formed, the hyperæmia of the surrounding tissues has an equally disastrous action; the normal processes of absorption and addition

are disturbed, absorption taking place more rapidly, while the newly-added material is less rich in chalky salts—the whole bone substance thus becoming more yielding and wanting in strength. In this manner the bones may become, in severe cases, quite soft and elastic. A careful examination of the dissected bones often shows minute fractures of the bony shell, these fractures occurring most frequently on the convex side of the bent parts. But it is impossible to make them out on the living subject. Complete fractures with crepitus and displacement are very rare. The pathology of rickets being as above described, the process of cure consists in a converse movement; the hyperæmia ceases, the superabundant bloodvessels are gradually obliterated, this involution being accompanied, as is always the case both in normal and pathological growth of bone, by a concentric deposit of new bony tissue in the area of the obliterating vessels,—the new bone thus deposited becoming exceptionally hard and dense. After laying down these principles as applying to rickets in every situation, the author proceeds to consider at great length the changes which take place in the individual bones. The paper is to be concluded in a future number.—*Edinb. Med. Journ.*, Dec. 1884.

Phosphorus in the Treatment of Tubercular Disease.

Tubercular meningitis is generally admitted to be one of the most hopeless of the diseases which a physician can be called upon to treat. This, doubtless, is the explanation of the fact—which comes also as a somewhat humiliating commentary on the present limitation of our knowledge and the instability of our theories as to the cause and nature of the malady—that the recommendation of a certain preparation of phosphorus, made a short time since by a correspondent of one of our contemporaries, led, in the course of two or three days only, to the exhaustion of the whole of the stock then in the hands of the manufacturers as well as of the retail dealers. The value of some combinations of phosphorus, of the hypophosphites especially, has been lauded by several competent observers, in the treatment of pulmonary and other affections which were believed to own a tubercular origin, although we experience some difficulty in assigning its just value to the specific adjective in this connection, inasmuch as one of the advocates of the hypophosphite treatment has recently stated his belief that the drug is only of real curative value in those cases in which the typical bacilli are absent. Phosphorus, pure and uncombined, however, is seldom or never administered as a curative agent in cases of tubercular meningitis. The remedies now most employed may be said to be chosen mainly with the object of avoiding or of allaying those symptoms of cerebral irritation which are usually the most painful, as they are apt to be the most conspicuous features of the disease. This, of course, is treatment only of a palliative sort; it does not, admittedly, go down so far below the surface phenomena as to attempt to deal explicitly with the formation, the growth, the very existence of that tubercular plasm whose presence is the exciting cause of the symptoms by which we have learned to recognize its nature. And palliative treatment, in cases such as these almost invariably are—cases in which the hopelessness of recovery is so enormous, and so generally admitted, that it effects and seems almost to justify a therapeutic paralysis—really resolves itself, if we dare to look the matter in the face, into a barely disguised ordering of euthanasia. Cases of complete and permanent recovery from “tubercular” affections of the lungs (whatever be the precise nature of the lesions grouped under that rather vague terminology) occur much less rarely than the pathologist of a generation since would have believed possible. Good observers hold that there is evidence of similar favorable results

having been attained in some cases of encephalic tuberculosis, despite the greater delicacy and importance of the structures involved in the cacopraxis, and this even in patients of an age at which the nervous centres are specially susceptible, and the whole bodily economy less capable of resisting the depressing influences of disease. But such observers are, as a rule, the first to admit that these instances are among the rare and happy surprises—the fortunate accidents—and by no means the rule of practice. Their total is so few, and their occurrences are so far between, as to force us to the conclusion that recovery, when it does take place, is in spite of, rather than because of, the therapeutic measures which have been used; a conclusion which is only further strengthened if we admit, as some would have us do, that many recoveries from tubercular disease pass unnoticed simply because the disease itself has not been recognized.

Phosphorus, given in the uncombined state, is recommended in various conditions of ill-health which are supposed to be connected with some form of “nervous” disorganization. No one doubts that the pure drug is at least potent; and there is ample evidence that, in some cases at all events, it is valuable. Phosphorus is generally regarded as a nerve stimulant; when given in therapeutic doses it probably has no claim to such a qualification. One at least of the stimulant properties with which it is commonly credited—an aphrodisiac action—is, as Dr. PHILLIPS insists, simply non-existent. It is probably far less an excitant than a corroborant or conservator of nervous energy; and hence in appropriate cases, its action is strengthening rather than exhausting. There is a form of “nervous” headache in which phosphorus gives prompt relief; in that condition of languor and undefinable *malaise* from which some young people of a tubercular diathesis are apt to suffer, it often proves most useful; and in certain neuralgias, and especially in the neuralgia of nursing women, to whom the usual hæmatinics have perhaps been given in vain, it commonly acts like a charm. We are scarcely justified then, it seems, in regarding phosphorus as a direct stimulant to cerebral activity; its action is less perhaps on the nerve cell than on its surroundings, and especially on its blood supply; and if its therapeutic effect is displayed rather in the husbanding of static nervous energy than in securing its too ready dissipation, we should have less dread of administering it in those conditions of disease in which the nervous centres are apt to be simultaneously excited and exhausted. The popular application of the *ohne Phosphor keine Gedanke* theory scarcely accords with the teachings of modern science, which again attaches less importance than formerly to the two per cent. with which phosphorus is accredited in the composition of brain-tissue. Indeed, we might say that phosphorus is more important to the maintenance of nervous energy than to the display of nervous activity; that it is less essential as a nerve food than as conditioning nerve nutrition; that it is more directly concerned with nervous health than with nerve work.

In addition to this view of the value of the drug, the possibility of its action as a directly curative agent in cases of tubercular disease is suggested by a consideration of the results claimed for phosphorus in the treatment of rickets. In 1872 Wegner published the results of experiments showing the effects of phosphorus, given in oily solution or in emulsion, in solidifying the growing bones of both animals and human beings. Kassowitz (*Arch. f. Kinderh.*, B. 5, H. 3 and 4) has repeated and extended these experiments. Like Wegner, he found that under the influence of very minute doses the compact was increased at the expense of the cancellous tissue; but he proved, in addition, that this increase was due to a shrinkage of the medullary spaces, and not to any fresh disposition of bone. On gradually increasing the dose, however, a point is reached at which the action of the drug appears to be reversed, so that cancellous tissue is found

even under the periosteum, and the medullary spaces are increased in size, with the formation of numerous greatly diluted bloodvessels. The rachitic process thus artificially produced is an inflammatory one, and is displayed in the ends of the diaphyses. In some of the animals experimented upon, the sciatic nerve of one side had been divided; but as this made no difference in the results as affecting the two limbs, it may be concluded that the drug acts through the blood and not by nervous influence. Since 1879 Kassowitz claims to have treated 560 rachitic children by the plan thus suggested, giving $\frac{1}{120}$ to $\frac{1}{60}$ of a grain a day, with remarkable and uniform success. The value of this treatment of rachitis is supported by Soltmann, but is opposed by Schwechten, and by Weiss of Prague. The results of the experiments on which it is based, however, have a direct bearing upon the treatment of tubercular disease by phosphorus. If small doses of this remedy produce marked constriction of the bloodvessels, especially in young and rapidly growing tissue, it does not appear unreasonable to suppose a gradual starvation of tubercular nodules, with consequent shrinkage and desiccation. Cases of "cured tubercle" are recognized by the discovery of encysted caseous or cretaceous masses; and it is noticeable that those drugs which have been found useful in tubercular meningitis (although mostly given for other reasons), such as opium (Bristowe), codeia, (Harley), chloral, bromide of potassium, etc., possess the power of diminishing the calibre of the bloodvessels. Practice is the only bar at which appeals of this kind can be judged; as yet we are still in the region of theory and empiricism on this question. We would raise no hopes, we have no ambition to see an addition to the list of so-called "specific" remedies. But tubercular meningitis is a very fatal disease, for which at present we know of no hopeful treatment. If we agree with Trousseau that "imminent peril justifies the extremity of daring," we may not unreasonably receive without prejudice a plan of treatment which comes before us with at least some theoretical advantages.—*Medical Times and Gazette*, Oct. 4, 1884.

Bony Tumor of Brain.

The formation of true bony growths in the substance of the brain is believed to be of rare occurrence. It is possible that the apparent rarity is due to the infrequency of post-mortem examinations of the cranial cavities of senile individuals. M. Witkowski has placed on record some of the particulars of an example of osseous tumor of the brain. The morbid growth was of the size of a walnut, and occurred in the left hemisphere at its occipital part; it was quite independent of the pia mater or ependyma, being surrounded on all sides by brain matter. Its shape was like that of two pyramids set together at their bases; its surface was studded with a number of spicules, points, and folds, the last of which had a certain resemblance to the convolutions of the brain. The tumor was encased in a fibrous capsule, and presented many excavations filled with brownish or yellowish soft material, which was discovered on microscopical examination to be of the same structure as the marrow of bone. The fibrous capsule or periosteum of the tumor was composed of a dense connective tissue, calcified in parts. After the tumor had been decalcified by treatment with chromic and nitric acids, a hyaline ground substance was brought into existence, and lamellæ with bone corpuscles and Haversian canals were to be seen. The tumor was connected with the nervous substance by means of a delicate connective tissue strewed with amyloid corpuscles. There were no other osseous formations in any part of the central nervous system. The brain on the same side as the tumor was certainly more consistent than the right hemisphere, and the microscope exhibited an increase in the amount of connective tissue and stellate cells. The cerebral arteries were

extensively thickened, and many small foci of the brain were in a state of softening. Some degree of internal and external hydrocephalus was found, and the ependyma was thickened. The brain was that of a man, aged seventy-nine years, who had never shown any symptoms of brain mischief during life. No accident could be assigned as the cause of the formation, which does not appear to have been an ordinary psammoma.—*Lancet*, Oct. 11, 1884.

Varices of the Œsophagus.

M. HANS BENDZ has recently called attention to varices of the œsophagus caused by circulatory troubles of the portal system, especially in cirrhosis of the liver. After a rapid introduction of his subject, he gives a detailed history of the case which called out his article.

The case in question was that of a man, æt 55 years, who, after about a year, showed evident symptoms of cirrhosis of the liver with a considerable degree of ascites, and died suddenly from profuse hæmatemesis. The stomach and small intestine contained a considerable quantity of blood at the autopsy; the mucous membrane was of normal condition, and was diffusely red, sometimes a clear red, sometimes deep. The liver was cirrhotic. The œsophagus showed in its inferior portion tortuous, dilated, varicose submucous veins. At the summit of a varix was encountered a longitudinal opening with thin and pale edges. The author emphasizes the fact that the opening was only discovered by the swelling of one of the trunks. There is no doubt but that all the blood which escaped from the mouth, and which was found in the intestinal canal, escaped from this opening. Bendz mentions a case observed by Odenius, but not yet published. In this case also there was cirrhosis of the liver, with considerable ascites. On the day on which the patient died a considerable quantity of bloody fluid escaped from the mouth, and at the autopsy a bloody liquid was found in the stomach and small intestine. The mucous membrane was neither infiltrated with blood nor tumefied, but was in a normal state. The veins of the lower portion of the œsophagus were distinctly dilated. Bendz shows that, as in his case, the hemorrhage came from the œsophageal veins, and believes that such an opening as he has described may be easily overlooked at the autopsy unless great care be exercised.

In the eighth case (nineteen were collected) observed by Bendz, the varices were similar to those in the first case, but there was no hemorrhage and the circulatory disturbance was not so marked. The author thinks that this disturbance was due to the fact that the patient's respiration had been of the abdominal type for several years, thus subjecting the liver to a pressure which interfered with the free passage of the blood through the portal vein. In five of the cases collected the circulatory disturbances were distinct and important, and the hemorrhages considerable and fatal.

From a consideration of these cases Bendz passes to a consideration of the relations and importance of varices of the œsophagus. Though they were recognized many years ago, it is only in the last ten years that any importance has been attached to them; which is explained by the fact that it is only within that time that the bearings of portal disturbance on the general circulation have been more fully recognized. Bendz draws a marked distinction between true varices of the œsophagus, varices pertaining almost exclusively to the lower portion of the œsophagus, and the phlebectasie often encountered in persons of advanced age, which are found all along the canal, though principally in the upper portion. With the latter he does not concern himself in this paper. The origin of the first is clear; they are formed just as other vascular dilatations

in other parts of the body. Bendz severely criticizes the interpretation given by Neelsen, of the origin of varices of the portal vein in general. Neelsen has taken no account of the fact that, in all the cases cited by him, the varices occupy the same part of the portal system. Nor can Bendz indorse the theory of Chautemps, referred to by Dussausay. From Zenker's statistics it would seem that true varices of the œsophagus, even in cases of cirrhosis of the liver, are rare.

As regards the anatomy of these varices, the question arises: Does the œsophageal circulation belong to the portal system? Dussauday, relying on the facts in a case examined by him, presumes that most of the œsophageal veins belong to the portal system. Bendz, on the contrary, concludes from the fact that Fürst has examined twelve cases without finding such connections, that it is only in exceptional cases that the œsophagus furnishes a greater or less amount of blood to the portal vein. These exceptional cases, however, are of great importance in the formation of varices of the œsophagus. If, in a parallel case, a trouble of the portal circulation is brought about, there are more open and spacious ways for a supplementary circulation, and varices may be more easily formed than in ordinary cases, in which the communication is made by the submucous veins of the cardia alone. From the situation of the varices in some of these cases, Bendz concludes that they are due to an abnormal distribution of the veins.

The local sequelæ of varices of the œsophagus are dilatation of the canal, causing dysphagia, and erosions of the mucous membrane covering the principal vessels. Their general importance is principally due to the fact that they may cause hemorrhages by rupture or by ulcerations. On the one hand they are of such a nature as to render good service by furnishing a supplementary circulation, and thus preventing ascites. On the other hand, this may render the diagnosis very difficult, especially if the cutaneous veins are not dilated at the same time. From what was found in the first two cases, Bendz does not agree with Dussausay in thinking that the development of varices of the œsophagus, in cases of cirrhosis of the liver, will always prevent ascites. — *Nordiskt Medicinskt Arkiv*, Bd. xvi., Hft. 9.

Infectious and Parasitic Pneumonia.

Prof. GERMAIN SÉE read a paper on this subject before the Académie des Sciences, on Nov. 24th. Whilst of late years, he said, pneumonia has been regarded as the type of simple inflammation, the cause of this inflammation has been attributed to cold. Struck by the observation of a number of cases in which pneumonia behaved as a true infectious disease, successively attacking several members of one family, he has, in his clinical lectures at l'Hôtel-Dieu, opposed the classic doctrine since 1882, and has taught the infectious nature of the disease. Since that time numerous cases, published in England, Germany, and elsewhere, seem to prove that pneumonia may, under certain circumstances, be developed as is typhoid fever, breaking out in a prison, a school, barracks, or a village, and attack a large number of people just as one of the more clearly defined infectious diseases. The question therefore arises: Are these cases to be considered as a special variety of pneumonia or only ordinary pneumonia? The answer is that the identity of the two kinds of pulmonary inflammation has been demonstrated; there is no pneumonia originating from cold; whether occurring as a sporadic or epidemic disease, pneumonia is always parasitic.

The micro-organism of pneumónia was simultaneously demonstrated in Germany by Friedländer, and in France by Talamon, Prof. Sée's Chef de Clinique. According to Talamon, the parasite of pneumonia is an oval micrococcus, from $1\ \mu$ to $1.50\ \mu$ long, and from $.50$ to $1\ \mu$ broad; it is constantly found in hepatized

lung tissue. As seen in the fibrinous exudation, it has the form of a grain of wheat. Cultivated in a liquid medium, in alkalinized solution of meat extract, it is elongated, tapering, and looks like a grain of barley. It is sometimes single, sometimes coupled two together as diplococci, and sometimes occurs in chains of four. Friedländer's description is very similar to that of Talamon, but he claims to have also found, besides the pneumonic cocci, a capsule which he regards as the essentially characteristic element of the micrococcus. This capsule does not exist, and has nothing to do with the micrococcus: it is a result of his method of preparing and coloring the exudation. Fränkel, at the last Berlin Congress, declared that the capsule is not a constant phenomenon; that it may be found entirely irrespective of any micro-organisms, and that the capsules cannot possibly be considered as characteristic of the micrococci of pneumonia; and Friedländer has recently renounced the idea that it is in any way distinctive of the pneumonic micro-organism.

Whatever it may be, this micrococcus is not found in the inflamed lung alone; it has been isolated and cultivated in a liquid and solid medium; and, inoculated in animals, has produced lobar pneumonia, such as is seen in man. Thus far, no irritating substance introduced into the respiratory passages has caused lesions characteristic of frank pneumonia; a special action of the micro-organism is needed to cause it. Friedländer and Talamon, by injecting cultures of the micrococcus into the lungs of mice and rabbits, have caused typical cases of pneumonia, precisely similar to that occurring in man. In a number of cases the microbe, by emigrating from the lung and invading neighboring organs, has caused at the same time pleurisy and fibrinous pericarditis of the same nature as the pulmonary inflammation.

From these facts we cannot hesitate to regard pneumonia as a specific parasitic disease; it may be reproduced in animals, but the reproduction is impossible with ordinary irritants, physical or chemical. In order that the characteristic inflammation be developed, it is necessary that a special microphyte be brought in contact with the lung tissue, and there multiply. The inflammation remains localized as long as the micro-organism does not pass the limits of the pulmonary tissue; this is *simple* pneumonia. It extends and becomes generalized when the microbe invades the general circulation, either through the lymphatic or vascular system; when it becomes *infectious* pneumonia.

This parasitic pneumonia may be absolutely distinguished from the other forms of acute pulmonary inflammation, usually described under the name broncho-pneumonia. Without doubt, microbes also play a part in these cases; but that part is secondary; the course of the disease, as well as the extension of the lesion, is here dominated by the existence of a previous bronchitis, due to the influence of cold, and by the propagation of this bronchitis to the finer bronchi and the alveoli. Broncho-pneumonia, developed from bronchitis *a frigore*, has nothing definite in its evolution; it proceeds by successive and irregular stages. Like the eruptive fevers, parasitic pneumonia has a definite course. Its duration is within fixed limits, and usually does not last more than six or nine days; it is characterized by intense hyperpyrexia; the temperature keeps at one point for about a week, following an unvarying course, as in all acute infectious diseases, dominating during this period all local manifestations and physical signs, and then falls suddenly, often on the seventh day.

As regards treatment, our object should be to tide the patient over the seventh day, as the disease usually declines at this time. Venesection and tartrate of antimony should not be used. The temperature should be kept down by quinine and antipyrine; the patient kept up by alcohol and nourishing liquid food.—*L'Union Médicale*, Nov. 29, 1884.

Sclerosis of the Coronary Arteries and the Affections depending upon it.

LEYDEN, in an article on this subject in the *Zeitschrift für klinische Medizin*, Bd. vii., says that since a deeper insight has been made into the relations of certain pathological changes of the heart with diseases of its vessels, the attention of clinicians has been drawn to sclerosis of the coronary arteries, and the affections which seem to depend upon it. Samuelson found that confinement of or pressure upon the coronary arteries caused a marked diminution of the cardiac contractions, with corresponding lowering of the blood-pressure; whilst Cohnheim and Schulthess-Rechberg observed that after a previous state of irregularity of the pulse, the strongly-beating heart suddenly stops.

Leyden gives the following as the pathological anatomy of the affection:—

1. Sclerosis or ossification of the coronary arteries, without special changes in the heart. The heart-muscle does not suffer, and the patient dies of an intercurrent disease.

2. Acute thrombotic softening, or formation of hemorrhagic infarctions in the heart-substance, consequent upon sclerotic thrombosis of the diseased arteries—myomalacia cordis of Ziegler. This leads, at a later period, either to fatty degeneration in the occluded vascular districts, or to softening, the most frequent cause of rupture of the heart.

3. The chronic form, fibrous degeneration of the heart-muscle, myocarditis fibrosa, arising from the callous-formations in the affected vascular districts. In this manner, also, aneurism of the heart is frequently produced at the apex.

4. A combination of the above-mentioned varieties, the most frequent of all. Clinically, these forms are seen in a more or less acute, or more chronic form, and Leyden classifies them as—

(1) Acute cases, with sudden termination in death. Death occurs in a fainting fit, or after an attack of angina pectoris. In some cases an autopsy shows very marked, in others very slight, anatomical changes in the heart: rupture of the heart, hemorrhagic infiltration with extravasation of blood into the pericardium, softening or only small foci of fatty degeneration or slight softening of the heart-muscle. Whilst these cases are reported as cases of embolism of the coronary arteries, we have the symptom of slowing of the pulse (Samuelson) frequently very pronounced, or sudden paralysis of the heart.

(2) Cases of subacute course, showing that the severe course of the disease runs through a number of weeks. There are certain forerunners of the disease—as cough, dyspnoea, frequent attacks of angina pectoris, sometimes even dropsy. The patient may then improve for a while, when severe symptoms will suddenly appear, and death take place. An autopsy will show myomalacia, hemorrhagic infiltration, fatty degeneration, and signs of old fibrosis.

(3) Chronic cases, generally described as chronic myocarditis, fibrous myocarditis, dilation or aneurism of the heart. In persons of advanced age, heart-symptoms develop slowly, and sometimes disappear. There may be attacks of angina pectoris or cardiac asthma. The course of the disease is almost always progressive; whilst the symptoms increase the patient presents the phenomena of severe disease of the heart, and under the increase of the asthmatic attacks, and the appearance of dropsy—and not very seldom of delirium, sometimes, also, in sudden attacks—the disease terminates fatally.

The symptomatology of sclerosis of the coronary arteries is that of an acute or chronic disease, with more or less striking phenomena, independent of valvular affections of a progressive character, coming at an advanced age, and leading to a diminished functional activity of the heart. The cardiac symptoms are prominent, the vital or physiological more so than the physical; and angina pectoris,

asthmatic attacks, weakness of the heart, fainting fits, changes in the heart's activity, both in frequency and rhythm, and in some cases a prolongation of the diastolic period, are seen in these cases. Physical examination shows dilation of the left ventricle, whilst the right is usually hypertrophied. The complications on the part of the respiratory apparatus are cough, dyspnoea, catarrhal affections and attacks of pulmonary oedema. The most frequent causes of arterial sclerosis are heredity, the abuse of alcohol, and high living. Physical and mental strains also play an important part.—*Centralbl. für klin. Medicin*, Sept. 20, 1884.

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Acute Pancreatitis in Child-bed.

Dr. R. HAIDLEN, of Stuttgart, reports the following case from Dr. Fehling's private practice:—

A woman, æt. 33 years, became pregnant, and during the period of gestation had considerable gastric disturbances and headache. She was delivered with the forceps, there was no post-partum hemorrhage, and the after-period was normal, until the third week after delivery, when there was some hemorrhage. A little later she had two attacks of pain in the region of the stomach, and five and a half weeks after delivery she had a very severe attack of pain in the pyloric region, accompanied by vomiting. There was no elevation of temperature, the pulse was 100–104, and regular. The epigastric region was sensitive to pressure, but there were no symptoms of peritonitis; the skin was pale, and not icteric. The patient seemed somewhat collapsed. In the afternoon of that day she seemed worse, the skin was paler, the pulse small and more frequent (110 to 120), and the vomiting had ceased. The sensibilities were normal.

Physical examination showed marked swelling of the abdomen, great sensibility of the pyloric region, the paraneurium free, the uterus small, movable, not sensitive; there was diarrhoea; the urine was passed spontaneously in considerable quantity; there was a considerable amount of gas in the intestines. Warm fomentations were placed over the painful regions, subcutaneous injections of camphor were ordered, and champagne and fluid diet. On the following day the patient was better, but the symptoms returned, and she died collapsed in ninety-six hours.

The autopsy showed that there was no peritonitis, though a small amount of a dirty bloody-looking fluid in the lower part of the peritoneal cavity. The organs, with the exception of the pancreas, were normal. Examination of the pancreas showed that it had undergone considerable changes; it was longer, thicker, and broader than normal, and in only a few places was its normal color retained; it had changed almost entirely to a brownish-red, blood-suffused mass, containing a small clot of blood on the anterior surface, in contact with the mesentery, but there was no perforation anywhere. The adjacent portion of the mesentery was suffused with blood.

The microscopic examination was made by Prof. Ziegler. He made the diagnosis as acute pancreatitis, with hemorrhage into the tissue of the organ; the microscope also showed small-celled infiltration of the pancreatic tissue. The duct of Wirsung was somewhat dilated.

Dr. Haidlen, after an extensive search for the report of a similar case, has found an account of the symptomatology of acute pancreatitis only in Strümpel's *Lehrbuch der Speciellen Pathologie und Therapie*, Bd. i. p. 714. A few cases of inflammation of the pancreas are found in literature; the affection commences with severe colicky pain in the epigastrium, and vomiting and collapse soon follow. The pulse is small, the extremities cool, and death occurs in a short time. The pathological appearances are such as have already been described. As to the etiology, nothing is known.—*Centralbl. für Gynäkologie*, Sept. 27, 1884.

Peptonuria.

Dr. GROCCO, of the University of Pavia, has an article on this subject in the *Annali Universali di Medicina e Chirurgia*, August, 1884, in which he draws the following conclusions:—

1. Peptonuria is always a morbid symptom, and clinically is entirely independent of albuminuria. 2. It is a symptom of both local or general, infectious or non-infectious diseases. 3. Of the general peptogenic affections may be mentioned paludism, typhoid fever, scorbutus, purpura hemorrhagica, septicæmia, and acute phosphorus poisoning. 4. The local affections giving rise to peptonuria are almost exclusively of an inflammatory nature, with a tendency to supuration. Among these may be mentioned especially acute and subacute nephritis. 5. Peptonuria occurs under rare pathological circumstances; as when there is a rapid development of a malignant neoplasm. 6. When encountered with a strictly local affection it is symptomatic of inflammation tending to suppuration. —*L'Union Méd.*, October 12, 1884.

Large Enemata of Nitrate of Silver in Chronic Dysentery.

Dr. STEPHEN MACKENZIE read a paper on this subject before the Clinical Society of London, on November 14th. He alluded to a former series of cases he had brought before another society, and stated that extended experience had strengthened his belief in the value of large enemata of nitrate of silver in the treatment of cases of chronic dysentery or dysenteric diarrhœa. The mode of procedure he adopted was as follows. The quantity of nitrate of silver to be used was dissolved in three pints of tepid water in a Leiter's irrigating funnel, which was connected by india-rubber tubing with an œsophageal tube with lateral openings. The patient was brought to the edge of the bed, and made to lie on his left side, with his hips well raised by a hard pillow. The terminal tube, well oiled, was passed about eight or ten inches into the rectum, and the fluid allowed to force its way into the bowel by gravitation. The injection rarely caused much pain, and often none. It usually promptly returned; but, when long retained, it was advisable to inject chloride of sodium, to prevent absorption of the silver-salt. Various strengths had been used, from thirty to ninety grains to three pints of water; but usually one drachm of nitrate of silver was employed. The treatment was based on the view that, whatever the nature of dysentery, whether constitutional or local, in the first instance, the latter effects were due to inflammation or ulceration of the colon, which was most effectually treated, as similar conditions elsewhere, by topical measures. Sometimes one, sometimes two, injections were required, and in some cases numerous injections were necessary; but in all the cases thus treated, many of which had been unsuccessfully treated in other ways previously, the disease had been cured. In most cases other treatment was suspended, but in some, Dover's powder or perchloride of iron, which had been previously administered, was continued or subsequently prescribed.

The cases narrated were these. 1. One in which the disease had lasted several years on and off; two injections were used, and the case was cured in six weeks. 2. Second attack, duration uncertain; four injections used; cured in five weeks. 3. Duration two months; two injections used; cured in three weeks and a-half. 4. Duration five years; one injection used; cured in three weeks. 5. Duration eighteen months; two injections used; cured of dysenteric symptoms, but remaining under treatment for diabetes. 6. Duration fourteen months; one injection used; cured in seven weeks. The treatment, which laid no claim to

novelty, was brought forward to elicit the experience of others who had tried it, or to induce others to employ it in suitable cases.

Dr. CULLIMORE asked for information as to the duration of allied cases of disease treated in the hospital by other methods than that practised by Dr. Mackenzie, and also whether the author of the paper was inclined to confine such treatment to cases of rectal dysentery, or to apply it to others as well. He commented on the fact that most of the cases recorded were those of sailors, and suggested that the favorable result might be, in great part, due to the improved surroundings of the patients, the physiological rest and appropriate diet, etc., afforded in hospital, as compared with the depressing surroundings of an existence on board ship. In his own experience of the treatment, he found that pain was produced, in one case, on injection of two pints of water, holding forty grains of silver-nitrate in solution. In another case of dysentery, due to famine, he injected half a pint of water containing iodoform, but without effecting any good result. Opium and krameria were, in his opinion, the most useful remedies in this class of cases.

Dr. S. MACKENZIE said he purposely used the term chronic dysentery, or dysenteric diarrhœa, in writing his paper, as being most appropriate to the kind of cases under discussion, these being characterized by teasing diarrhœa and considerable constitutional disturbance. In a previous paper, he had explained that the physicians at the Seamen's Hospital had spoken hopelessly of all kinds of treatment; but, at the London Hospital, greater opportunities existed for making observations in this respect than at any similar institution, with the exception of the one just named; and in all his own cases, the effects of rest, opium, etc. had been tried in vain before resort was had to the injection-method of treatment. He alleged that rebellious cases were cured by the enema, and that it was, therefore, a resource to be adopted whenever the ordinary remedies failed. He himself would adopt it in ordinarily severe cases at the outset of treatment. He had no definite statement to make as to the permanence of the cure, the class of patients concerned being the most difficult of any to keep under observation; but, in this connection, it might be interesting to the Society to know that one patient cured by him had returned twelve months after being discharged, not on his own account, he being still well, but to solicit Dr. Mackenzie's good offices in behalf of a friend who was suffering, as he had been, from chronic dysentery.—*Brit. Med. Journ.*, Nov. 22, 1884.

SURGERY.

Extirpation of the Larynx.

Mr. TIMOTHY HOLMES reports the case of a man, æt. 63 years, who was admitted to St. George's Hospital on May 16, 1884. He had been in perfect health up to Christmas. Then he began to complain a little of sore throat, and deafness in the left ear. Soon afterwards, the neck became stiff, and he was conscious of a swelling on the left side. For the past six weeks, he had had difficulty in swallowing and breathing. Solids seemed to stick about the level of the cricoid cartilage, and sometimes to come up into his mouth again. Latterly, he had had a very troublesome choking cough, with frothy blood-stained expectoration. He had no fits of dyspnœa, but his breathing was becoming more difficult. For the last month his voice had been very hoarse; he had found it very difficult to

talk long, and had been forced to live on fluids. He had been getting weak and losing flesh. On admission, he seemed tolerably well nourished. His complexion was dusky, and his voice hoarse and indistinct; respiration was noisy and labored, and cough was frequent. The thyroid cartilage was expanded and bulged, especially on the left side. Above the larynx, there was considerable fulness on this side, reaching up to the jaw, and extending in an irregular manner up the neck. The new growth here seemed firmly attached to the structures around, but the trachea was quite free. The larynx was examined by Dr. Whipple, who reported that the growth involved the epiglottis chiefly, but also, probably, the arytenoids. A portion of the epiglottis had been destroyed by the ulceration of the growth. No view at the larynx could be obtained.

If the case were to be treated at all, two courses presented themselves: to wait until the obstruction to breathing or swallowing became formidable, and then either perform tracheotomy simply, or attempt the entire extirpation of the growth; or to make that attempt at once. The fact that the man was suffering more from pain in deglutition than from dyspnoea rendered it very important to remove the ulcerated epiglottis; while the extent to which the disease already extended outside the larynx rendered it doubtful whether it could be removed even at present, and nearly certain that, in a little while, it would be beyond the reach of operation. Under ether, a vertical incision was made from the hyoid bone to about the fifth ring of the trachea, and was crossed by a horizontal incision; and after the surface of the windpipe had been carefully exposed by dissection, about three rings of the trachea were divided, and the trachea plugged with Semon's modification of Trendelenburg's tampon. Then an incision was made in the middle line of the cricoid and thyroid cartilages, with much difficulty, owing to their extensive ossification. The thyro-hyoid membrane was exposed and divided, the upper corner of the thyroid separated from the hyoid bone, and the right half of the larynx removed; on the left side, the left half of the cricoid cartilage was left, as that cartilage was quite unaffected. On that side, much difficulty was experienced in defining the morbid mass, which lay external to the larynx, extending up towards the tonsil; ultimately, after conducting the dissection as high as possible, it was felt that something had been left behind. The pharyngeal wall had been very freely removed. Not much blood was lost, as the vessels were easily secured as they were divided. On the termination of the operation, a tube was passed down the œsophagus, and the greater portion of the large incision was united. He was fed, partly through the œsophageal tube, partly by nutrient enemata, but never rallied satisfactorily, and died about forty hours after the operation. The disease was epithelioma, and affected almost the entire epiglottis, and the portions of the larynx immediately adjacent. The mass outside the larynx was continuous with that inside, and a portion of the mass outside the windpipe, on the left side, had been left behind, and lay in contact with the pharynx, extending as high as the tonsil.

The case seemed to be a fairly appropriate one for the operation, allowing the operation to be in itself justifiable. It is true that the disease had spread external to the larynx, and that it might prove (as it did prove) impossible to completely extirpate the disease. But this could not be determined before operation. Expectant treatment held out no better prospect, and, as there was no serious dyspnoea, tracheotomy could do no good. On the other hand, the man was rapidly wasting from the difficulty of swallowing occasioned by the condition of the epiglottis and parts around it, and the only chance of relieving this appeared to be removal of the affected parts.

But the history clearly shows how formidable the operation is, and how uncertain is the prospect of even succeeding in removing the whole disease, when the

latter is of a cancerous nature. Readers of Mr. Butlin's work on *Malignant Disease of the Larynx* will recollect that he lays down (on page 63) the doctrine that extrinsic carcinoma is an incurable disease, in which extirpation affords no prospect of benefit; and that, in intrinsic carcinoma, though extirpation may be practised with fair prospect of benefit when the disease is limited to the laryngeal cavity, yet, when it has spread beyond the larynx, or has affected the glands, the prospect is almost as hopeless as in extrinsic carcinoma. The above case certainly supports this doctrine.

I may add that, if I should ever be called upon to repeat this operation, I think I would perform the preliminary tracheotomy a few days previously to the extirpation. The operation is one attended with profound shock, as this case testifies, even when there is no excessive hemorrhage, and no operative accident; and this might be lessened by dividing it into two parts.—*British Medical Journal*, October 25, 1884.

Wounds of the Heart.

E. ROSE, in an article on heart-tamponade (*Deutsche Zeitschrift für Chirurgie*, Bd. xx. Hft. 5), contributes twenty new cases of wound of the heart, four of which he saw after death, the other sixteen being treated by him. Wounds of the heart are by no means so immediately dangerous as is generally supposed. Of Rose's cases only one was really killed by the wound, three others died of other severe injuries, and independently of the heart-wound, one fourteen days after gunshot wound of both lungs. In three of these four cases the wound of the heart was as good as healed at the time of death.

Heart-wounds are easily diagnosticated from those of the left lung, as the symptoms of pneumopericardium are very characteristic. A second class may be made of heart-wounds without injury of the lung, but with profuse external hemorrhage. There is a third class, easily overlooked or undervalued, of heart-wounds with or without quick closure of the wound, as in rupture of the heart by fracture of the ribs, stab-wounds, etc. These cases are not infrequent, and the heart should be examined daily. The chief danger for the patients in whom, on account of the absence of a wound or its small size, there is no immediate external hemorrhage, is the sudden distension of the pericardium with blood—heart-tamponade. In this case the action of the heart is mechanically hindered, so that the wounded person often dies very quickly of suffocation, apparently of most extreme cyanosis and heart-failure. This should be prevented by absolute rest on the back, ice-bags to the heart, strict diet, etc. If it occurs in spite of this, venesection and removal of the effused blood by opening the pericardium are recommended.

HEGAR, of Hamburg, in commenting on this paper, says that Rose has not performed this operation which he recommends. He compares the operation to tracheotomy (for impending suffocation), but does not mention the great danger of a second filling up of the pericardium, and a condition as bad as at first. The effect of venesection is well seen by the following case. A young physician was stabbed in the cardiac region. Rose found him struggling for air, speechless from dyspnoea, blue in the face, and lying on the bed. The pulse could not be felt. In the upper cardiac region was a knife-wound, a finger's breadth wide, which did not bleed, and was not gaping. The cardiac dulness was enormously increased. Rose bled him profusely; the pulse became markedly better, and the suffocation abated. The more the blood flowed the better the pulse became. Rose thinks that he took over two pounds of blood. The hæmopericardium was rapidly absorbed, and the patient was healed in five weeks.—*Centralbl. für Chirurgie*, Sept. 20, 1884.

Lumbar Nephrectomy for Renal Calculus.

At the meeting of the Royal Medical and Chirurgical Society, on Nov. 25, Mr. HENRY MORRIS reported the case of a laborer, æt. 35 years, who had suffered from well-marked symptoms of renal calculus of the right side since the end of 1881, and had been under the care of Dr. Douglas Powell at the Middlesex Hospital, came again under treatment in October, 1883. In November, 1882, Mr. Morris had explored his kidney digitally, and with the probing needle, but did not detect the stone. On October 24th, 1883, the exploration was repeated, but, again failing, the kidney was removed through the lumbar incision. The patient made an uninterrupted recovery, and at the present time was hard at work as a charcoal-burner—"is as well," his medical adviser reported, "as ever he was in his life, and able to work without the slightest inconvenience." The kidney excised was of normal size and appearance, and its secreting structure was found by Dr. Coupland on microscopical examination to be quite healthy. The organ, however, was harder and tougher than usual, and contained a rounded rough calculus, about the size of a marble. Careful daily examination was made of the urine by Mr. Paul both before the nephrectomy and for more than six weeks after the operation, so that the rapidity and power with which one kidney could take on the whole of the excretory function were shown in a table which formed part of the paper. The results were equivalent to those of a simple physiological experiment, because a healthy kidney (as far as its excreting substance went) was removed, and a healthy one was left behind. A comparison was made between the lumbar and the peritoneal methods of nephrectomy. It was shown that the arguments which had been used in favor of the peritoneal operation were more theoretical than practical; and that, if followed out, they were likely to lead to pernicious results. The conclusion arrived at was, that lumbar nephrectomy was, as a rule, the better operation, though there were exceptional circumstances and certain diseased conditions in which the abdominal method was preferable. In nephrolithotomy, the lumbar incision, and that only, ought to be employed. In judging of the condition of the kidney opposite to the one to be removed, we had to depend upon the general symptoms of the case, and upon the amount of urea daily excreted. But it was not correct to infer that the kidneys were diseased because they excreted a daily average quantity of urea even less than half the standard quantity. Persons who had long been living an invalid life, and who had lost much flesh, might, with perfectly sound kidneys, eliminate not more than from .8 to 1.8 per cent. of urea in the thirty to thirty-five ounces of urine that they passed in a day.

Mr. BRYANT congratulated Mr. Morris on his success, and proceeded to touch on the many interesting points in his case. In the first place, as a physiological experiment, it was important, as showing that a patient might do nearly as well with one kidney as with two. Again, the difficulty of diagnosis of the calculus, even after handling and probing of the kidney, showed that nephrolithotomy must, in all cases, be at first an exploratory operation. It would certainly have been better to have taken away the stone, and left the kidney; hence he felt the importance of Mr. Morris's suggestion to incise the pelvis of the kidney in future cases, in order to make the search for the stone more complete. In excision of renal calculus, he thought the lumbar operation preferable to the peritoneal, as giving a better access to the pelvis of the kidney, which lay behind the vessels, and was, in many cases, the most important point for incision. A more general and more important point was what was sufficient to justify the removal of the kidney. In pyonephrosis and hydronephrosis, he was inclined to think it was hardly ever necessary; by washing out and draining the tumor through the loin,

the cyst withered, and generally a small discharging sinus was left, which was not enough to have justified a larger operation. He had himself never removed a kidney, but he had drained three fluid tumors of the kidney, with results which showed that more would not have been justifiable. In one case, there was still a sinus discharging about four ounces daily, but that was comfortable, and no further operation was thought of. In some cases of very slow improvement, he had at first regretted that he had not removed the whole kidney, but afterwards had lost his regret on seeing them slowly recover.

Mr. HULKE had, like Mr. Bryant, never removed a kidney, but had frequently cut down upon one for stone, and preferred the lumbar incision. Very large tumors, he admitted, could only be removed through an abdominal incision, but for any but the largest he should advise removal by an extension of the ordinary lumbar incision. If an abdominal incision had been made for the removal of a large pyonephrotic kidney, and then an abscess were found, as would not be improbable, just behind the kidney, the danger of peritonitis would be much more serious than if the incision had been lumbar. Any operation, however, for nephrolithotomy must be tentative, for the diagnosis could never be quite certain. Some years ago a colleague of his had thought he had a renal calculus, and his opinion was shared, after examination, by most skilful surgeons, so that an operation had been determined upon. At the last moment, however, he shrank from the operation, and lived some time longer, and after his death it was conclusively shown that he had had no calculus at all. A boy under his care had had marked clinical symptoms of calculus, and he had examined the kidney through a lumbar incision, handled it carefully, and passed a needle through it without meeting with any stone, and at the time declined to go any further. He felt now, after hearing Mr. Morris's paper, that he ought to have made an opening in the pelvis of the kidney, and to have introduced a sound.

Mr. KNOWSLEY THORNTON said he felt that Mr. Morris was to be congratulated on his success, but at the same time it must be remembered that he had had an escape from the calamities of surgery. He had himself twice made the same mistake of missing the calculus, and so could speak with sympathy. Freer incisions of the kidney might have settled the point, and in not undertaking these Mr. Morris had missed one of the advantages of his lumbar operation. The symptoms of his case had begun, as Mr. Morris had told them, after lying in a damp barn; he thought it not unlikely that such chills were really one of the causes of the formation of calculi, and asked further information from the physicians. Mr. Morris objected to his plan of bringing the ureter out of the wound in abdominal incisions, as leading to intestinal obstruction. But that had not been shown to be the case, and it had not happened in former times when the much stouter ovarian pedicle had been similarly dealt with. That, in fact, had been proved to wither quickly; and he could not give up the teaching of his experience, which was that it was better to bring the ureter out of the wound. He might be in a minority, possibly of one, in saying that he preferred operation on the kidney through the peritoneum; but he had done it often with success, and he did not think that our present knowledge of renal surgery was sufficiently advanced for any very hard and fast rules. The abdominal operation certainly afforded the advantage of more complete inspection; and, in a recent case, he had found great benefit result from being able to see exactly where the stone was in the kidney, and to make his incision accurately to meet the circumstances of the case. The objection to the method hinged almost entirely on the fear most surgeons felt of wounding the peritoneum, and that he did not himself at all share; he had as soon wound the peritoneum as any other tissue in the body, and sooner than most others. He was more inclined to remove the whole kidney

than Mr. Bryant, for he had done so in some bad cases more than three years ago, who were now comfortable; and he could not consider the constant inconvenience of a renal sinus as anything less than serious. The case which Mr. Hulke had suggested, of an abscess behind a pyonephrotic kidney, would be certainly serious, however the operation had been begun; but he should have been inclined, after opening the peritoneum, to have drained the abscess in the loin, which, he thought, could certainly have been effected without fouling the peritoneum. In fact, he had performed such an operation in a case which he had shown recently at the Pathological Society. After lumbar incisions, could it be asserted that there had been no wounding of the peritoneum? He thought the *post-mortem* records would show that it could not. The lumbar operation, at present, had statistics in its favor, but he expected the results of the peritoneal operation to prove themselves better. There was decided advantage in being able to see the condition of the other kidney, and whether, indeed, there was another kidney. When a kidney was in the living body, and had the blood circulating in it, palpation could diagnose much more than when it was dead; and he was almost inclined to think that, in Mr. Morris's case, a stone might have been felt in life.

Mr. MORRANT BAKER remarked that deep rectal examination (as had been mentioned by some) was sometimes dangerous, and leads to rupture of the bowel, and that he could hardly think that much additional information, in difficult cases, could be gained in that way. In his own cases of nephrectomy (which happened to have been performed through the loin, because there had been previous lumbar incision for nephrotomy), he had introduced his hand between the kidney and its capsule, and removed the kidney whilst leaving the capsule, which constituted a defence against wounding the peritoneum. The cases were getting worse after nephrotomy, and it would have been impossible to keep them alive without hazarding the larger operation. One kidney, it had been said that evening, had been proved as good as two, but that, he thought, must be received with great caution when they remembered how slight a strain was sufficient to overtax a single kidney. That had been shown in one of his own cases after nephrectomy.

Mr. HENRY MORRIS said that his operation had certainly not proved a misfortune to the patient, for now he was capable of earning his own living. Mr. Thornton had suggested that he ought to have made more incisions in the kidney before giving up the search for a stone in it, and he fully realized that point now, but before the operation he had not his present experience to guide him. The ureter he was still inclined to leave in the wound, and not invite its sloughing by dragging it to the front of the abdomen. Its blood-supply was so different from that of the ovarian pedicle, that no just comparison could be made as to their likelihood of sloughing. He had no fear of the peritoneum, but great respect for it; and he avoided trespassing on it as he should avoid trespassing on the interior of a joint. In cases of nephrolithotomy, he still considered the arguments in favor of a lumbar, as opposed to a peritoneal, incision to be very strong. As to the supposed advantage of a view of the kidney not operated upon which was gained by an abdominal incision, he quoted a letter from Mr. Bennet May, of Birmingham, who had excised a scrofulous kidney through the loin. The patient died in five days; and, when a *post-mortem* examination was made, and the abdomen laid open more freely than in any abdominal operation, he was quite unable to detect the condition of the other kidney, which was really in a state of advanced caseous degeneration. He inferred that, in many cases, little help would be given by inspection, whereas in many others it was not wanted. Out of 4632 bodies examined at Guy's Hospital, there had only one case been

found in which one kidney was absent; and none, out of 1200 cases, at Middlesex Hospital; so that that was a chance that might fairly be disregarded. There was a case, it was true, in which a woman with only a single kidney had had that kidney excised, but she was a case of great deformity, having no vagina and no uterus, and the abnormalities of the genital organs were just those which experience has shown were associated with renal malformations. The loin formed a very convenient region for a drain, and he was strongly in favor of draining fluid tumors there; regarding a man from whom 10 ounces of urine were drained in the loin as in a better position than a man with only one kidney.—*British Medical Journ.*, Nov. 29, 1884.

Nephrectomy for Calculous Pyelitis.

Dr. E. SONNENBURG reports (*Berlin. Klin. Wochensch.*, Nov. 24) the case of a woman, æt. 52 years, who had suffered from pain in the right loin since last Easter, accompanied by fever, wasting, and polyuria. She came under Dr. Sonnenburg's care in August, when the presence of a large fluctuating tumor in the right half of the abdomen was ascertained, and on aspiration pus was drawn off from it. Nephrectomy by the abdominal incision was performed on August 25th. The operation was difficult and tedious, the thin wall of the cyst rupturing in the removal. The whole pedicle was secured to the wound, but it was found impossible to suture the peritoneum. The organ was converted into a chambered, pus-containing sac, with numerous thin-walled outlying cysts, and a large branching calculus was lodged in the dilated pelvis. Hardly any renal tissue remained. Great collapse followed, terminating in death on the second day, and during the whole interval no urine at all was secreted. There was no peritonitis; the left kidney weighed 190 grammes, and was anæmic, but histologically almost normal, except for some localized fatty degeneration of the renal cells and slight increase in places of the interstitial tissue. The fatal issue of the case could not, Dr. Sonnenburg thinks, be attributed to the shock of the operation and the collapse alone; but that the condition of anuria, the cause of which remains unexplained, was in the main answerable for this result.—*Lancet*, Nov. 29, 1884.

Contusions and Ruptures of the Intestine without Lesion of the Abdominal Wall.

M. CHAVASSE, of the French Army, reports two cases of injury of this nature, and has found 149 cases in literature.

The first case which he reports was that of a man who was kicked on the abdomen by a horse. The autopsy showed multiple intestinal lesions, and complete rupture of a loop of the small intestine. The second case was due to the same cause; but the patient recovered, as the injuries were mild. In the army, in times of peace, contusions and ruptures of the intestines are almost always caused by kicks from horses. In the report of the Surgeon-General of the Prussian Army for 1879-81, Beck reports 17 cases due to this cause. Of the 149 cases collected by Chavasse, this cause was present in 36 cases, exclusive of those reported by Beck; 23 cases were caused by the passing of a carriage or wagon wheel over the abdomen; 13 were caused by kicks from men.

The anatomical lesions found at the autopsy, in the case first reported, are of considerable interest. Three different sections of the intestines, superimposed from before backwards, were injured; the transverse colon and the duodenum were contused; and a loop of the small intestine, situated between them at the ileo-jejunal junction, was completely cut in two. The prevertebral tissues were infiltrated with blood, and showed traces of contusion. It was the least resistant

loop of intestine which, in spite of its position between the others, was most severely injured. These multiple lesions are not rare, and it is important to remember that they are more frequently produced by kicks from horses. In 23 cases the small intestine was injured 16 times, and the small and large intestine 7 times. In the 149 cases collected the mesentery was torn in 11. Bouley reports a case in which the rupture of the intestine was $1\frac{2}{10}$ inch long, and Lentz one in which it was $4\frac{2}{5}$ inches long; 14 cases of complete isolation are reported; of the duodenum 1; junction of the duodenum and jejunum 3; ileo-jejunal 10. Complete section of the large intestine has not been observed, very probably by reason of its anatomical nature, its size, and its ordinary state of distension by gas. As regards the frequency with which different portions of the small intestine are injured, Chavasse classes them as follows: 1. Small intestine—middle, superior, and inferior thirds; 2. Colon; 3. Duodenum; 4. Cæcum; 5. Sigmoid flexure. On account of its length the ileo-jejunal portion is injured six times as often as the other portions. It is curious to note that two cases of abdominal injury have been reported in which the lesions were limited to the peritoneum.

The question of the mechanism of ruptures of the intestine by these injuries has been variously interpreted by authors. Jobert, Forget, Baudens, and Legouest recognize no other method than that of compressing the intestine between the vertebral column and the impacting body. Longuet has shown experimentally that this explanation is perfectly justifiable. Parsavant reports a case in which three irregular perforations were made in the transverse colon by a blow from a large stone. In his work on internal pathology, Duplay gives three methods by which rupture may be produced: 1. Direct compression against the vertebral column; 2. Forcing of the intestinal contents from within outwards; 3. Compression of the intestinal wall between the injuring body and the matters contained in the cavity of the viscus. Of these the former is most probably the true explanation.

As would be expected, the principal symptoms are due to peritoneal reflex; sharp localized pain, repeated vomiting and purging; regularly progressive shock, and tendency to collapse; the face is pale; the extremities are cold; the temperature febrile, and oscillating about the normal, contrasting with the small, rapid pulse, and anxious and accelerated respiration. Peritonitis may or may not be developed early. It is necessary, in making a diagnosis, to eliminate lesions of other abdominal organs. If the liver is injured there will be a sensation of weight in the right hypochondrium; the pain, which is generally localized in this region, often radiates around the body, towards the xyphoid cartilage, or to the shoulder. If the gall-bladder is injured or ruptured, it will be shown by the presence of bile in the vomited matters. Lesions of the stomach will be shown by blood in the vomited matters from the beginning. The presence of blood in the urine and the amount of urine in the bladder will usually enable the surgeon to know if the kidneys or bladder are injured. Teludnovski gives as a sign of intestinal rupture an amphoric souffle in the right hypochondrium, the lung being uninjured. This symptom is not more valuable than the following, given by Spaggià. In auscultating the lateral abdominal and lumbar wall, one hears, in cases of rupture, a gurgling bruit caused by the inspiratory and expiratory movements, displacing the fecal and gaseous matters in the abdominal cavity. The presence of blood in the stools is a positive indication of a serious lesion; but it is rarely seen (four times in 147 cases), as marked constipation is almost always present. The existence of hernia at the time of the injury may cause a serious error in diagnosis.

The prognosis in a case of this kind should be very reserved. The mortality in the 149 collected cases was 96 per cent., death having occurred most frequently

between the twelve and twenty-four hours. On account of the high rate of mortality of ruptures treated by the ordinary means, the surgeon should not hesitate to perform laparotomy, and search for the injury. Whether a simple suture be placed in the intestinal wall, or the intestine be resected, or an artificial anus be made, must depend upon the extent of the injury and the judgment of the surgeon.—*Archives de Méd. et de Pharm. Milit.*, Nos. 13, 14, 15, 1884.

Excision of a Piece of Intestine.

Dr. JOSEPH GRINDON, of St. Louis, reports the case of a woman who received a stab-wound in the left groin, parallel to Poupart's ligament and about an inch above it. Through this opening there had protruded a mass of small intestine, mesentery, and omentum. There had passed out probably between six and eight feet of intestine. In one of the foremost loops were to be seen three cuts or tears, all communicating with the lumen of the gut, and close to the mesenteric junction. Two were on one side not quite two inches apart, and one on the other, as it were behind and between the first two. It seemed as though all three had been done at one thrust, the instrument passing in at one side, nicking the opposite wall, and passing out again on the same side of the bowel as it penetrated. The largest of these openings easily admitted the finger, the other two being much smaller, but through all there oozed blood and fluid feces. The condition of things here met with agreed with the observations of Dr. Parkes, of Chicago, in his recent experiments on dogs. He says, "Extravasation of the contents of the tube occurred in every case where the tube was wounded;" and again, "any perforation of the bowel, even a needle perforation, means extravasation." These cuts were not clean incisions, but contused, lacerated wounds, presenting the appearance of having been inflicted with a dull weapon.

It was at first proposed to throw ligatures about the wounds. The number and extent of the latter, however, would have made this manœuvre result in too great a narrowing of the lumen; on the other hand, the ragged character of the wounds, and the contused and ecchymosed appearance of the surrounding tissue did not encourage us in essaying to stitch the edges together. We therefore proceeded to remove a section of the gut about two inches in length comprising the entire circumference and including all the injured portion. In trimming off along the mesenteric border, a number of vessels were necessarily cut and tied. There was considerable eversion of the mucous membrane at each severed end; this was trimmed off with the scissors, and the gut brought together. Twelve or fifteen sutures of ordinary surgeon's silk were used; the needle being each time carried through all the coats in each direction. An interrupted stitch was put in at the mesenteric border, one directly opposite, and one half-way down on each side; between these was run a glover's suture. The free mesenteric edge was merely doubled over and left so.

The intestines were now well sponged off with clean water, no antiseptics of any kind being used, and returned to the cavity of the abdomen. The omentum slipped back without much trouble, but reducing the intestine, distended with gas from the removal of accustomed pressure and relaxation of the muscular tunic, proved to be no easy task. As one loop would be forced in, another would slip out. By slightly enlarging the opening, however, and making continuous and equable pressure with the extended hand while the patient was brought partially under the influence of chloroform, and the thighs flexed, the reduction was finally accomplished, the last loops being livid, intensely congested, and of most forbidding appearance. The external wound was closed with a stout piece of silk passed through the entire thickness of the abdominal wall, a compress applied,

and the patient dispatched to the city hospital. During the operation she had received two dram doses of laudanum. The patient left the hospital in six weeks.

The points to which attention is called are :—

1. The use of no antiseptic or germicide, except water. The surroundings were all of an unfavorable nature, the work being done in a back kitchen. It was a very hot day, and the patient lay next to a hot stove.

2. The fact of the woman's being in the puerperal condition not interfering with the successful issue of the case. Her former pregnancies, extending over a period of six years of married life, had resulted as follows, given in the order of their occurrence: A miscarriage at eight months (?); one at five months; a birth at term; a miscarriage at seven months, one at five months, and one at four.

3. The carrying of the sutures into the calibre of the gut, and not leaving the mucous lining untouched as recommended by Parkes and others. The mucous membrane which rolled out was trimmed off, as has been stated, still it is highly probable that at one or more points, portions of this surface were brought into apposition with each other.

The question might be asked, why excise at all, why not merely stitch up the wounds? I have already spoken of the unpromising look of the cut edges, but I may again quote Parkes. In his experiments, "when several wounds occurred close together, one piece, even if it amounted to ten inches, was removed;" and again, "wounds affecting the mesenteric border of the bowel were always the most serious, and always required complete resection of the part affected." And again, "when several wounds occur, say within four inches apart, make one resection to cover the whole."

Another interesting question regards the final disposition of the sutures. What became of them, or where did they go? Miller, Erichsen, Druitt, Holmes, Gross, Ashhurst, and the weight of evidence teach that they pass into the bowel, and are so cast out. I cannot do better than to quote again from Mr. Pollock: "This much, therefore, is evident: first, that soon after the application of a ligature or suture to any portion of intestine, fibrin is effused on its surface, and the ligature becomes thus shut out from the peritoneal sac. Secondly, the ligature equally soon commences to destroy that portion of bowel which is surrounded by the silk. Thirdly, that as the mucous membrane (forming one of the layers of that portion) dies or ulcerates, it opens inwards a path of escape for the ligature, which is only complete when each coat of the bit of intestine is entirely cut through; and, fourthly, that this path opens *into* the bowel, not *from* it."—*St. Louis Courier of Med.*, Oct. 1884.

Prolapse of the Omentum through the Rectum.

Dr. DOMENICO MORISANI reports the rare and interesting case of a woman, about thirty-nine years of age, who came under his observation in April, 1884. A few months before coming under observation she noticed, after going to stool, that something had come down into the anus. About a month after this she had an attack of intestinal catarrh, of a somewhat dysenteric form, and after a severe straining noticed that something was violently expelled from the rectum; this increased after each effort at defecation.

On examination it was seen that the anal orifice was greatly dilated, and that from it was a projection about twelve inches long. It was rigid, and described, to a certain degree, the arc of a circle. Its surface was knotty, and formed of a series of lumps, resembling the configuration of the transverse portion of the colon. The external surface was epithelial. On a straining effort being made it

projected about four-fifths of an inch further than usual, and returned with the straining. It was also seen that the recto-vaginal partition had become ulcerated through, and a great part of the feces was passed through the vulval orifice.

The following operation was performed under strict antiseptic precautions. The tumor was pulled down, and it was observed that there was a fold of mucous membrane closely united to it. On attempting to insert a tent between the fold and the tumor, the tent passed into a cavity. It was then drawn out, and the blade of a probe-pointed bistoury inserted; the blade was then turned vertically against the fold of mucous membrane so as to nick it in several places. Traction was again performed, and the drawn-out portion was at once thought to be a part of the great omentum. The finger was then introduced along the tumor and found to be in the abdominal cavity. It was also ascertained that the tumor had come down from the abdominal cavity by perforating the intestine.

Being convinced that the tumor should be removed, Morisani drew down from the abdomen the other portion of the omentum. Four points of the Spencer Wells' chain suture were then placed in the part drawn out, and afterwards tightened by crossing it in the omental tissue. About three-fifths of an inch below this ligature the tumor was cut off, and the pedicle dressed with iodoform and returned to the abdominal cavity. The opening in the intestine was then plugged with an antiseptic sponge, its edges freshened and stitched to the rectal mucous membrane. A second set of vertical sutures was then put in, and the whole wound dressed antiseptically. The patient died of septic peritonitis on the sixth day.

The autopsy, made thirty hours after death, showed a collection of pus in the pelvis, a small opening in the intestine, through which feces had extravasated, and the contents of the abdominal cavity agglutinated. There was considerable lengthening of the transverse mesocolon. The stomach was in its normal position, but the transverse colon was dislocated, being curved so as to form a sort of angle, the apex of which was in the pelvic cavity. The epiploica magna had entered an opening in the wall of the prolapsed colon and had gradually passed out *per anum*. There was nothing to show clearly how the perforation was caused.—*Rivista Internazionale di Med. e Chir.*, No. 7, 1884.

Retroperitoneal Hernia, due to Arrest of Intestinal Development.

This case, which is reported by Dr. CARL M. FÜRST, of Stockholm, was seen in 1881, in the anatomical amphitheatre in the Caroline Institute, in the cadaver of a tailor, aged 61 years. The body had been found in Lake Mälär, where it had been for half a day. There was no means of discovering whether or not the deceased had felt any inconvenience from his internal hernia during life.

On opening the abdominal cavity the entire colon was found on the left side, the cæcum being situated perpendicularly in the middle line. The small intestine was on the right side and directed downwards. About two-thirds of the small intestine were covered and inclosed in a peritoneal pouch on the right side, the pouch occupying the entire right lumbar region, and the adjacent portions of the right hypochondrium and of the umbilical region. This pouch was large enough to contain the two fists, and its mouth was directed downwards, forwards, and slightly to the right, its greatest diameter measuring 12 cm. It was limited by the free border of the peritoneal fold, the left cornu of which was divided into two folds, the one, more marked, extending to the mesenteric connection of the appendix vermiformis, the other disappearing in the mesentery of the small intestine at the level of the fourth lumbar vertebra. The right cornu, falciform,

was at first directed backwards, then descended to the left over the lower part of the kidney and disappeared in the right fold of the mesentery of the small intestine; the latter escaping from the pouch by a simple free convolution. The stomach was normal, but the duodenum was directed in a zigzag manner to the right by three parallel convolutions.

At the level of the second lumbar vertebra the intestine was crossed by the attached upper border of the peritoneal fold already spoken of, and entered the upper part of the pouch at the duodeno-jejunal fold. It then received a mesentery, the attachment of which extended from the middle of the second lumbar vertebra, downward and to the right, to the right side of the promontory; from this point to the lower border of the fourth lumbar vertebra, to the left of the median line, then passed to the right after a short turn, and descended into the mesocolon, which extended to the left flexure of the colon. The fold of the cæcum was situated in the middle line, and the ascending colon mounted vertically. Thence this last viscus turned, at the height of 10 cm., horizontally to the left, described a descending convolution until it reached the sigmoid flexure, when it mounted to the left flexure of the colon and again took its normal position. The ascending colon was inclosed in the above-mentioned peritoneal fold, and had what may be termed a double mesentery, one, which formed the left wall, inclosing the vessels and mesenteric glands, the other only cellular tissue. The epiploon was twisted and irregular.

There was no abnormality of any of the other viscera.

Fürst is of the opinion that the position of the intestine was the effect of an arrest of development dependent on an anomaly of the suspensory ligament of the duodenum, this view being supported by the zigzag direction of the duodenum. He adopts Gruber's explanation of the arrest of development (*Bildungshemmung*) of the mesentery, and cites several cases mentioned by Chiene, Clason, and Tscherning.

The explanation of the origin of the hernia is based in part on the descriptions given by Preitz of the embryonic conditions conducing to torsion of the intestine. At the same time Fürst criticizes Waldeyer's argument against the explanation given by Preitz of the fixation of the ascending and descending colon, which is due to the fact that the anterior abdominal wall requires the mesocolic peritoneum on account of its growth, whilst Waldeyer asserts that the mesenteric folds are in no way required for parietal coverings, but that the cause of the shortening of the mesocolon should be sought in the growth of the kidneys. Fürst thinks that the difference in the explanations given by Preitz and Waldeyer consists in the fact that according to the latter it is the middle fold, and according to the first the lateral fold of the mesocolon which is required.

The origin of the hernia is due to the fact that the cæcum, which, at the beginning of the third month of fetal life, is situated in the middle line and high up under the liver, is prevented from passing to the right by the free small intestine. The lateral peritoneal fold of the mesocolon exerts, by the growth of the abdominal wall, strong tension on the lower fixed part of the duodenum. In this way a sort of peritoneal fold is formed by the descent of the cæcum while growing. This fold, the concavity of which was directed downwards, covered a portion of the small intestine, and finally caused hernia after the intestines were filled with food and gas. The dilating force exerted by the intestines on the peritoneal pouch caused the cæcum and ascending colon to assume a vertical position.

Fürst thinks this the more simple and probable explanation of the anomalous condition of things found in this case: The superior posterior attachment of the pocket passed over the lower part of the duodenum, whilst the free border of the hernial opening passed towards the cæcum, in the small mesentery of the

vermiform appendix; and finally, that a simple intestinal convolution passed out of the hernial opening, and the ascending colon was found between the leaves of the peritoneal fold. The fixation of the mesentery of the lower portion of the ileum, which ascends and then descends, drawing it to the right and passing into the mesocolon, is a strong argument in favor of a more recent descent of the cæcum.—*Nordiskt Medicinskt Arkiv*. Bd. xvi. Hft. 15

The After-Treatment of Lithotomy when the Bladder is Sacculated or Pouched.

In a paper on this subject, in the *Lancet*, Nov. 8, 1884, Mr. REGINALD HARRISON says that sacculation or pouching of the bladder is not only a frequent cause of stone in adults, but is probably the most serious complication attending its removal. An ill-shapen bladder often renders lithotomy out of the question, whilst it increases both the dangers of lithotomy and the liability to a recurrence of stone. A careful study of the results of lithotomy in adults not only shows them to be unsatisfactory when compared with the immediate risks of the operation, but also seems to point to certain defects in the after-treatment to which it is desirable to direct attention. To remove a calculus out of a pouch or depression in the bladder, and not at the same time to provide against urine lodging in the cavity thus formed for its reception and decomposition, is to incur a risk of cystitis and septicæmia which is by no means an imaginary one. It must be remembered that a sacculus has no power of expelling its contents; its walls contain no muscular fibre, and it is entirely dependent on its relation to the general cavity of the bladder for the emptying of whatever it may contain. The small mortality following lithotomy in children and the extraction of stone in women is largely due to the fact that the conditions in both are favorable to the thorough drainage of the bladder.

I have recently been adopting a system of drainage after lithotomy and other cases in which the bladder has been opened which has so far proved a great benefit. In the first place, in all instances of stone complicated with a large prostate and with sacculi on a depressed floor, I have been particularly careful by a sufficient division of the prostate to make a free access to the bladder; this has sometimes necessitated the section of the gland to a greater extent than was requisite for the removal of the calculus.

To provide free drainage after the operation for all depressed portions of the bladder, the following plan has been adopted (it is practically that of the double tube in tracheotomy): Through an ordinary lithotomy tube open at the end is passed and retained a rubber catheter, or drainage-tube; this adapts itself to the inequalities in the walls of the bladder, and can be made to enter any sacculus that may be present. In a recent case, though the ordinary lithotomy tube seemed to be draining efficiently, I had from the general symptoms reason to believe that some urine was retained. On introducing the rubber catheter in the manner described, several ounces of fetid urine escaped, after which the progress of the case was good. By the double tube a constant system of drainage is carried on, so that urine escapes immediately on entering the bladder.

I would remark that to rapidly heal up a bladder which in its mechanical construction has all the elements necessary for the production of calculus is not in my judgment a wise proceeding, as long as anything can be gained by not doing so.

In cases of calculus associated with residual urine and a large prostate, I have had some excellent results in cases in which it was deemed desirable to retain the lithotomy tube for considerable periods of time—partly for the purpose of

draining and partly with the view of bringing about a permanently improved condition in the outlet from the bladder—namely, cases in which the tube has been retained for six, eight, or even ten weeks.

The advantages of the double tube after lithotomy performed under the circumstances mentioned may be summarized as follows:—

1. The prevention of vesical colic and spasm by retention of clots and the plugging of the ordinary tube with blood.

2. The more perfect drainage of the floor of the bladder, however irregular this surface may be.

3. A ready mode of washing out all parts of the bladder without removal of the outer tube. For the latter purpose, one of Tiemann's double current rubber catheters, fitted on to a Higginson's syringe and passed through the ordinary lithotomy tube, answers admirably.

4. Increased facilities for keeping the patient dry, by having the inner tube sufficiently long to conduct the urine into a vessel by the patient's bedside; the bed may be kept absolutely dry until the time comes for the removal of the tube altogether. This is a point of great importance, especially in elderly persons, who are liable to bedsores and suffer much from the immediate presence of ammoniacal urine.

The tenesmus and pain at the end of the penis which are sometimes caused, where the prostate is large, by the retention of thick ropy mucus on the floor of the bladder are considerably mitigated by this plan, combined with the free use of some solvent for this secretion. The best solvent for vesical mucus I have yet found is a solution of common salt in warm water, with which the bladder should be washed out by the double tube as described, as often as necessary. In all cases of this kind the tubes should be retained and drainage employed until the urine shows that it can pass through the bladder without undergoing decomposition in it; as long as there is any sign of the latter, there is a risk of the reformation of stone. A considerable number of the softer stones are entirely of vesical origin. The prevention of these necessarily brings under consideration the remedying of the causes upon which they depend. These latter are not always difficult to discover.—*Lancet*, Nov. 8, 1884.

Iodoform in Soft Chancres.

UNNA (*Monats. für prakt. Dermatologie*, August, 1884) finds that for the present no remedy heals the soft chancre more rapidly than iodoform, and none with such certainty obviates the occurrence of a suppurating bubo. The drawback is the peculiar and suggestive odor which no combination serves entirely or permanently to mask. One cause of the diffusion of the odor is the custom of employing iodoform in powder; too much, more than necessary is thus applied, and the powder is apt to be deposited on the clothes during or after application. He therefore advises that iodoform dissolved in ether be used. The sore is first dried with absorbent cotton, then a drop of the iodoform ether allowed to fall on the sore, and the evaporation of the ether favored by blowing on it with a hand-ball bellows. Thus a thin coating of iodoform is deposited exactly on the ulcer. Over the ulcer so coated he places a small piece of perforated iodoform plaster-muslin, which has been brought to perfection as regards its preparation by Beiersdorf, of Altona. If this appears too thin, a circular band of the same can be wound round the penis, or a strip applied if the ulcer is seated elsewhere. Lastly, to conceal the smell, a piece of cotton-wool, perfumed by means of a spirituous solution of cumarin, is placed over all. If desirable, this wool can be sprayed

over with some volatile aromatic fluid. When the ulcer occurs in the *mœtus urinarius*, he supplies the patient with a pencil of iodoform composed as follows :—

R—Iodoformi	10.0	
Gummi Arabici	3.0	
Gummi Tragacanthæ	1.0	
Glycerini	1.0	
Aq. q. suff.		M. Fiat bacilli, N. 5.

These are kept in a little wooden box. After voiding urine, the pencil, made pointed, is dipped in water and several times introduced with a screwing motion into the meatus. A small piece of the perfumed wool is now passed in between the lips, and a larger piece wrapped round the glans. Unna further remarks that these pencils serve as valuable prophylactics against infection from gonorrhœa or soft sore.—*Edinb. Med. Journ.*, Dec. 1884.

The Treatment of Perforating Ulcer of the Foot.

In an article on this subject, Mr. FREDERICK TREVES draws attention to the following plan of treatment, which, in the two cases in which I have as yet tried it, may be considered to have met with a degree of success. On examining these ulcers it is obvious that the dense rigid ring of heaped-up epithelium that surrounds the sore or sinus forms a very grave bar to healing. The ulcer could never heal as long as its margin is set in an annular induration that prevents an approximation of its edges and an opportunity for the display of the healing process. Even if the ulcer were to become filled up with granulations its final closure would still be a matter of considerable difficulty, since the skin, that takes so active a share in the healing of such lesions, would be seriously hampered in its activity. The plan alluded to is this: The patient is confined to bed and the sole of the foot is kept continuously poulticed with linseed meal. This causes the epithelium to soften and swell up, so that at the end of twenty-four hours the ring around the sore appears as a very prominent softish white mound. All this redundant epidermis is then shaved away with a scalpel, and the poultice is reapplied. At the end of another twenty-four hours the deeper layers of epithelium that were not affected by the first poulticing have become swollen and prominent. They are in turn cut away. The poultice is again applied and the scalpel used day by day, until the whole of the epidermic mass has been removed. This object will be effected at the end of about ten or fourteen days. By this time the skin about the ulcer will, as a result of the continued poulticing, have peeled off in a thick white layer, and around the sore will be nothing but thin fresh pink epidermis, looking active and healthy. The ulcer in the mean time will be found to have cleaned, and by the loss of its cutaneous boundary will appear less deep. The poultices are now discontinued, and to the sore is applied a paste, of the consistence of thick cream, composed of salicylic acid and glycerine, to which is added some carbolic acid in the proportion of ten minims to the ounce. This paste is applied on lint, and is quite painless. The ulcer soon heals, and when the patient gets up he is instructed to wear a thick pad of felt plaster over the spot, with a hole in its centre that corresponds to the scar of the recent sore. This plaster should be always worn. As one objection to this measure it may be urged that, although pressure may be taken off on one part of the sole, an ulcer may appear at some other spot where pressure has effect. As far as my two cases go, this result has not yet happened; and it is to be noted that, although a large area of the sole is normally exposed to pressure, these ulcers have a tendency to appear only in certain spots. The patients should also be instructed to pay great attention to the cleanliness of the feet, to wear well-fitting woollen stockings and easy boots.—*Lancet*, November 29, 1884.

Excision of the Head of the Femur for Spontaneous Dislocation.

At the meeting of the Royal Medical and Chirurgical Society, on October 28, Mr. WILLIAM ADAMS contributed an example of spontaneous dislocation of the head of the femur on the dorsum ilii, occurring during the progress of rheumatic fever, in a boy eleven years of age. The patient was admitted into the Great Northern Hospital on the 4th March, 1882. After two unsuccessful attempts at reduction, having previously divided the adductor longus tendon, he had excised the head of the femur on the 29th March, making a λ -shaped incision with the long arm two and a half inches in length directly over the head and neck of the bone: and the small arm, one inch in length, transversely over the head of the bone, which was at once exposed uncovered by capsular ligament, and the articular cartilage in a healthy condition. It was found that the capsular ligament had been ruptured, and the torn margins of the rent passed on either side of, and closely embraced, the neck of the bone. After dividing the margins of the capsular ligament he passed his small subcutaneous saw to the neck of the bone, and cut through it a little below the margin of the articular cartilage. The detached head of the femur was then drawn out of its position after some slight adhesions had been cut through. The round ligament preserved its normal connection with the head of the bone, and was adherent to the articular cartilage, having been divided with the saw a little below the head. The wound progressed favorably without much suppuration, and on the 1st June was completely closed. On the 14th June the patient was allowed to walk on crutches, and on the 1st October without crutches. The limb was perfectly straight, and the movement at the hip-joint freely permitted in all directions. The author observed that in all the cases of spontaneous dislocation which had fallen under his observation the head of the femur had been dislocated on to the dorsum ilii. These he arranged in three classes: (1) Dislocation occurring during the progress of fever. (2) Dislocation occurring in cases of paralysis, generally infantile, but occasionally in the adult. (3) Dislocation occurring in the first stage of hip-joint disease without suppuration. Excision of the head of the femur in its simplified form as above described the author believed would be found applicable to all these cases, unless sufficient freedom of motion be obtained by tenotomy and passive movements. He also thought it might be applicable to some cases of fibrous ankylosis of the hip after disease when the limb remained contracted, as free motion was seldom obtained by simply dividing the neck of the bone. The cases of dislocation of the hip brought before the Society by Mr. Morris were alluded to, and also the cases published in *St. Thomas's Hospital Reports*, by Sir William MacCormac, in which he excised the head, neck, and great trochanter in a case of unreduced traumatic dislocation of the hip into the thyroid foramen. The firm adhesions, and, in some cases, new bone thrown out in cases of traumatic origin as the result of the inflammation following the injury, the author observed, distinguished these cases from cases of spontaneous dislocation occurring during the progress of fever, or in cases of paralysis which had chiefly fallen under his observation.—*Medical Times and Gazette*, November 1, 1884.

Resection of the Knee.

In a recent contribution (*Mittheilungen aus der Chirurgischen Klinik zu Tübingen*, 1884) on resection of the knee in cases of fungous disease, Prof. BRUNS states that of late he has attained much better results from this operation in consequence of certain improvements in its performance, in the dressing of the wound, and in the after-treatment. In nineteen out of twenty cases in

which, during twelve months, the knee was excised for tubercular disease, the wounds healed by primary intention under the first dressing. Formerly, it is pointed out, the chief object in resection of this joint was to remove the whole of the diseased bone. Since, however, fungous articular disease has been regarded as an articular tuberculosis, and this view has been confirmed by the discovery of the tubercle-bacillus in the granulations of the synovial membrane and of the articular extremities of the bones, more and more attention has been directed in the operation to a careful extirpation of the granular synovial membrane. In each of the above-mentioned cases as much care was taken in removing all the diseased tissues, both within and without the joint, as would have been done in the extirpation of a malignant growth. Not only the fungous articular synovial membrane, but also the synovial pouch communicating with the joint, especially the subcrural mucous sac, was completely removed by the use of the knife and scissors. Moreover, the peri-articular tissues, as fasciæ, ligaments, and muscles, whenever diseased, were, together with the capsule, carefully removed. Peri-articular abscesses were also extirpated, and abscesses reaching upwards on to the thigh were slit up along their extent, and the abscess-membrane of each was not merely scraped away with a sharp spoon, but was extirpated *in toto*. Professor Bruns takes away the patella and also the ligamentum patellæ, the posterior surface of which is closely connected with the capsule and a pouch of the articular synovial membrane. The dissection should be carried on until healthy structures are exposed, and until finally, in front of the articular ends of the long bones, all the soft parts between the skin and the bones are removed. Notwithstanding the great extent of the wound, primary healing always takes place, as only healthy tissues are left, and all parts that might include the existing agents of inflammation are carefully removed. The great danger of relapse after excision of a tubercular joint is known to most surgeons, and has been proved by König's tables of 117 cases. In most instances, the relapse is due to the retention of tubercular deposits in the soft parts. In the knee-joint, the anatomical conditions are such as to favor a radical extirpation.

Prof. Bruns holds that it is necessary to remove the patella in almost every case of fungous disease. The retention of this bone complicates the healing of the wound, renders difficult complete removal of the synovial membrane, and increases the risks of relapse. An exception to this rule is made in some cases of resection of the knee in children. In consequence of the very probable dangers of arrest in the subsequent growth of the limb after resection on young subjects, it is necessary to remove as little of the bone as possible, and to endeavor to perform only a partial operation. If most or every part of the articular cartilages be left intact, the patella must be retained, as the patient will very probably recover with a movable joint.

Prof. Bruns states that in some cases the most suitable mode of incision is that known as the inferior curved excision, which is carried across the front of the joint and through the ligamentum patellæ, so as to form a superior flap. In the majority of cases, however, of fungous disease of the knee, the superior curved excision, recently advocated by Hahn, will, it is held, be found the most convenient. This incision forms an arch with the convexity directed upwards, and is made through the tendon of the quadriceps muscle. The flap thus formed, which contains the patella, is turned downwards, and the upper recess of the joint is at once freely exposed. When this recess is much diseased and extends far upwards in front of the thigh, the superior curved incision is by far the best. Much importance is attached to this recess, as being almost constantly involved in fungous disease, and as being the starting-point of relapse after resection. Another advantage of the superior curved incision, Prof. Bruns points out, is

that the wound in the soft parts is not in the same line with that in the bones, and that the cleft between the same surfaces of the femur and tibia is covered by the flap, and not so much exposed, as in the usual operation, to external influences. In ten of the twenty recent cases of resection of the knee, Prof. Bruns made the superior curved incision, in nine cases the inferior curved incision, and in the remaining three the patella was sawn across obliquely and then removed. In each case dressings of corrosive sublimate were applied, the ends of the bones were kept in contact by two nails, and the edges of the flap were brought together by sutures applied as carefully as in a plastic operation on the face. The limb, having been inclosed in "wood-wool," was then put up in a Watson's splint and plaster-of-Paris bandage.—*London Medical Record*, Oct. 15, 1884.

OPHTHALMOLOGY AND OTOTOLOGY.

Cocaine as an Anæsthetic in Ophthalmic Practice.

At the meeting of the Society of Physicians of Vienna, on October 17, Dr. KARL KOLLER read a paper on this subject. The anæsthetic influence which cocaine exerts when applied locally to the mucous membrane of the tongue led Dr. Koller to try its effect on the eye. After referring to the publications of Schroff, Anrep, and Freud, he made several experiments on animals in Professor Stricker's laboratory, from which he found that two or three drops of a two per cent. aqueous solution of chloride of cocaine, introduced into the conjunctival sac, rendered the cornea and conjunctiva quite insensible. If he scratched with a needle, or even perforated the cornea of animals so treated, or passed a strong electrical current through it or touched it with caustic, the animals felt no irritation at all. As to the duration of this anæsthesia, he could obtain no idea from his experiments on animals. He tried to find out if cocaine had also an influence on the inflamed cornea. He first produced keratitis in animals by introducing a foreign body into the eye, and he found that the cocaine also acted as a local anæsthetic under these conditions. The success of these experiments on animals led him to try the effect of cocaine on the human eye, and he had obtained the following results: (1) One or two minutes after introducing a few drops of a two per cent. solution of cocaine chloride, the cornea and conjunctiva were rendered completely insensible; he could seize the conjunctiva with hooked tweezers and exert considerable pressure on the cornea, and the patient felt nothing, nor were there any reflex movements. The anæsthesia lasted from seven to ten minutes, and disappeared gradually. (2) Simultaneously with the anæsthesia, considerable dilatation of the palpebral orifice occurred, which he explained by the absence of the sources of irritation which otherwise affect the cornea and conjunctiva. (3) The ocular and palpebral conjunctiva became anæmic. (4) Fifteen minutes after introduction, mydriasis set in. It was never present in any great degree; after an hour it decreased considerably, and totally disappeared some hours later. During this period the pupil reacted quickly. (5) Paresis of accommodation set in together with the mydriasis, and also disappeared with it. (6) When the application of the above-mentioned solution of cocaine chloride was continued, and repeated every five minutes, the anæsthesia of the cornea lasted from fifteen to twenty minutes, and the deeper parts of the eyeball became anæsthetic, its sensibility being much

diminished on pressure. (7) The application of cocaine never produced any signs of irritation. Dr. Koller had further made therapeutic experiments with cocaine in Professor v. Reuss's clinic, and found that it was a good anodyne in diseases of the eye which were associated with pain. He obtained good results with it in various diseases of the cornea and conjunctiva, which were associated with pain and photophobia, as, *e. g.*, syndesmitis lymphatica and erosions of the cornea; it was also of use in cases in which the touching of the eyelids with nitrate of silver would cause severe pain. He recommended the application of cocaine in cases of iritis and iridocyclitis where the contraction of the vessels must render good service. The application of cocaine as an anæsthetic in ophthalmic operations had excellent results in thirty cases of removal of foreign bodies from the cornea, in cases of tattooing cicatrices on the cornea, in two cases of operation for staphyloma in children, as well as in several iridectomies and operations for cataract. When the anæsthesia in these operations was produced according to the method which Koller had recommended, *i. e.*, with a five per cent. solution, the patients stated that they felt nothing of the corneo-scleral incision, while the seizing and excision of the iris caused them but little pain. In this respect he quoted an interesting case in which iridectomy was performed on a man who had suffered from "seclusio pupillæ," affecting both eyes; the solution was applied in the operation on one eye and omitted when the other eye was operated on a week later. The patient declared he felt no pain at all during the first operation, but his restlessness during the second operation rendered it difficult.—*Med. Times and Gazette*, November 8, 1884.

Chiselling of the Mastoid Process.

Dr. ARTHUR HARTMANN reports 14 cases of chiselling of the mastoid process, with 12 recoveries and 2 deaths. He gives a short general review of his practical experience, as follows:—

The incision of the skin and the opening of the bone should be practised at the line of attachment of the auricle, or, at least, immediately behind it.

In two cases of the entire number the operation was performed on the healthy surface of the mastoid process. In both cases the skin incision was made at the line of attachment of the auricle, and the mastoid was opened directly beneath this. In both cases the collection of pus was reached at a trifling depth. In the other cases with formation of fistules it likewise proved most judicious so to incise the skin that the bone beneath the line of attachment of the auricle, or immediately behind it, should come into the region attacked by the chisel. It did not seem advisable to carry the operation-canal further backward on account of the danger of injuring the transverse sinus. According to the results of examinations of the cadaver already communicated, and which are essentially in accord with those of Bezold and others, a sharp forward curve of the transverse sinus toward the posterior wall of the auditory canal is very frequent. In 100 temporal bones, the shortest distance between the sigmoid fossa and the posterior wall of the auditory canal amounted in 41 cases to 1 cm. or less, in 1 case to 5 mm., in 5 cases to 6 mm., and in 6 cases to 7 mm. The average distance was 11.5 mm., the maximum 19 mm. The danger of wounding the transverse sinus is best seen on horizontal sections. As we cannot foretell whether we shall, in operating, chance upon a sharp curve of the transverse sinus, such a possibility should always be borne in mind. Those who are familiar with the anatomical relations of the parts will, therefore, avoid the use of drills or trephines, such as are employed by many physicians. When, in using such an instrument, the sinus

is chanced upon, an injury to it is inevitable, whereas, in the operation with the chisel, as the ground is kept clear for inspection, we can recognize the danger in time and avoid it. In the operation, special attention should be paid to the fact that the more the sinus projects forward, so much the nearer does it approach the external surface of the bone. Accordingly when a sinus is markedly curved forward we reach it at a trifling depth.

As for the danger of penetrating into the middle cranial fossa, he holds to the principle previously laid down, that the operation-canal should not extend higher than the level of the upper wall of the auditory canal. Anatomical investigations have shown that the floor of the middle cranial fossa is not infrequently separated from the upper wall of the auditory canal by only a thin long lamella, and lies but a little above it, which state of affairs he has described as the low position (*Tiefstand*) of the middle cranial fossa. In operating on the cadaver after the manner of Buck (*Arch. of Ophthal. and Otol.*, vol. iii. p. 212), who sets the drill a little above the line of the external canal and penetrates inward, and a little upward and forward, he penetrated the middle cranial fossa with the drill in three cases out of one hundred. In operating, the skin incision and the bony canal should be made so large that a free inspection of the wound-cavity may be possible during the after-treatment. In this way it becomes easy to remove pieces of bone which become detached later. Moreover we can (and he considers this of the utmost importance for a complete and permanent cure) remove remaining or luxuriant granulations with the sharp spoon or with caustics. In order to maintain the passage open for after-treatment, rubber tubes are inserted immediately after the operation, to be replaced later by thick, and still later by thin, lead ones. These lead tubes can be easily prepared by rounding one end of a small piece of tube with the knife, and giving to the other end a funnel shape by splitting it and bending the two halves apart. The advantage of the lead tube over the lead nails is, that through the former the secretions can pass, while by the latter their discharge is impeded. The operation-canal must be kept patent until such time as the wound-cavity has diminished in size concentrically, by the development of sound granulations. Soft granulations are removed as above mentioned, or are caused to shrink by cauterization with the nitrate of silver.

For complete removal of old retained secretions or cholesteatomatous masses in the mastoid process, we find it impossible in many cases to dispense with the inflexible tympanum-tube, which he has recommended for cleansing the drum cavity and its recesses. To prevent inflammatory reaction after the operation, the covering of the walls of the cavity, and of the canal in the bone, with powdered iodoform has proved of most avail. In none of the operated cases did inflammatory reaction ensue. With the existence of acute symptoms before the operation, there followed in all cases an immediate recedence of the symptoms and a surprisingly rapid cure, which he thinks should be attributed to the employment of the iodoform.¹ Both fatal cases may be excluded from consideration here, as in these the operation was done at a stage of the disease when a favorable result was not to be counted on, as the symptoms of cerebral disease had already developed. In the use of the iodoform there is a circumstance upon

¹ In one of these operated cases, a patient with acute inflammation of the middle ear and involvement of the mastoid process, the mastoid was chiselled open on Feb. 10th, the perforation of the drum membrane had closed on the 13th, the lead tube was removed on the 18th, and on the 23d, the patient, at his own request, returned to work with a small superficial granulating wound.

which, possibly, the favorable effect of the remedy depends—namely, that the iodoform forms with the underlying tissues a soft, firmly attached crust; indeed, it is impossible to get a good view of the wound-cavity until after some days, when the crust has come away of itself or has been removed. By this crust-formation, on account of the scanty secretion, we can leave the first dressing unchanged for two or three days.

When we consider, on the one hand, that the artificial opening of the mastoid process in acute, as well as in chronic, diseases, leads to a prompt and perfect cure, and that the operation must be regarded as entirely free from danger; and, on the other hand, the often very tedious, incomplete recoveries accompanied with severe functional disturbance which now and then result from conservative treatment, we must decide in favor of the former plan; so much the more as under the conservative method there is always danger during its course of the extension of the disease deep into the mastoid. Again, in the chronic forms we are frequently unable to decide whether or not sequestra exist, which can only be removed by an operative procedure.—*Archives of Otology*, vol. xxii. No. 2.

MIDWIFERY AND GYNÆCOLOGY.

Craniotomy in Germany.

Dr. ADOLPH MERKEL contributes to a recent number of the *Archiv für Gynäkologie* an analysis of 100 cases of craniotomy occurring in the Leipzig clinic. Statistics are of very little use in determining questions relating to this operation, because its results depend almost entirely upon the personal dexterity of the operator, the cases in which the operation is done, and the time at which it is done. An obstetrician who recognizes the necessity for the operation early, and therefore does not waste time in fruitlessly attempting delivery by other methods, and who handles his instruments skilfully, ought to get a mortality, as far as the mother is concerned, not larger than that of ordinary labor. There are, however, two points in Dr. Merkel's communication worth noting. One is, that his results of craniotomy followed by cephalotripsy are better than those in which the latter operation was not done. The other is, that the author finds the scissor-shaped perforator (Levret's is the form he uses) better than the trephine, which is so commonly used in Germany, and recommended in German books. The latter discovery English practitioners have long since made; and we doubt not, that if they will try the English perforators, German obstetricians will come to agree with Dr. Merkel.—*Med. Times and Gaz.*, August 9, 1884.

Separation of the Symphysis Pubis during Labor.

Dr. E. F. ELDRIDGE reports the case of a woman who had been unable to walk for some time without the aid of two canes. On examination he found her pregnant, at nearly full term; the abdomen was enormously distended, the wall of the vagina relaxed and partially prolapsed, the symphysis pubis was separated three-quarters of an inch, and the bones at the sacro-iliac synchondrosis quite movable.

She said that the inability to walk had gradually come on ; that she could feel her hips move up and down when she stepped, and that she felt as though she was being pried apart. At her confinement, which took place a week later, the normal pains came on, and the contractions were strong and regular. The presentation was normal and in the first position, but progress was slow, the labor lasting seven hours. The child was a male, weighing ten and one-half pounds, and looked as though it was at least a month old ; the head was large, the fontanelles nearly closed, and the skull remarkably ossified. During the passage of the head through the outlet of the pelvis, the symphyses separated one and a quarter inches, so that two fingers could be passed between them.

She made a good recovery, the bones returned to their normal position, and finally united as firmly as before ; locomotion is perfect. She said that she was troubled in the same way at her last confinement, but not to such an extent.—*Chicago Med. Journ. and Exam.*, Dec. 1884.

The Value of Unilateral Incisions for Preventing Ruptures of the Perineum.

In an exhaustive article on this subject CREDÉ and COLPE, after studying the subject of ruptures of the perineum in regard to their frequency and the means for preventing them, pronounce themselves decidedly in favor of the unilateral incision ; much preferring it to the recommendation of some authors that the rupture be allowed to occur, after which it may be cured by immediate suturing.

The following objections have been made to the lateral incision : 1. It may easily lead to more or less extensive ulceration after delivery, and thus retard recovery ; 2. The wounds resulting from the incision may be the point of origin of infection ; 3. The incision does not always prevent rupture of the perineum ; 4. However small the incision may be, the operation is painful ; 5. Finally, the incisions leave traces, and may favor, up to a certain point, occlusion of the vagina.

In reply to these objections, Credé and Colpe give the following statistics from the Leipzig Maternity Hospital, showing that as regards the numbers of perineal lesions there were, in 1000 primiparæ cases, 392 ; of these, there were 259 lateral incisions, or 25.9 per cent. ; spontaneous ruptures 104, or 10.4 per cent. ; ruptures in spite of incision 29, or 2.9 per cent. Of 1000 multiparæ cases, there were 12 lateral incisions, or 1.2 per cent. ; spontaneous ruptures 24, or 2.4 per cent. *En résumé*, of 2000 cases of labor there were 271 lateral incisions or 13.5 per cent. ; ruptures 128, or 6.4 per cent. ; ruptures in spite of incision 29, or 1.4 per cent. As regards the sequelæ of these 2000 labors, 229 went out of the Maternity in about fifteen days.

As regards infection the dangers of the lateral incision should not be exaggerated. Of the 2000 cases tabulated, there were 33 deaths, 19 being due to infection, the remaining 14 to puerperal eclampsia, ruptures of the uterus, and intercurrent diseases. Besides the 19 cases of septicæmia, of 1572 labors with intact perineum, there were 15 deaths ; of those with the lateral incision there were 4. It is rather more difficult to draw any definite conclusions as to the infectious accidents (non-mortal) during the labors, as there were a great many normal labors in these cases ; but it is quite certain that the lateral incision plays no part in the production of disease.

As regards the objection that the lateral incision does not always prevent rupture, the statistics from the Leipzig Maternity show that, of 300 cases of epistomy, there were 29 ruptures of the perineum, or 9.6 per cent. But it should be noted that in 25 of these cases there were other unfavorable circumstances ; in 15

cases the children were very large; and of the 15 cases the forceps were used in 3 cases; there was 1 case of faulty engagement; and 4 of granular vaginitis. In 7 other cases in which the children were not of large size, the perineum was weakened by syphilis in 3 cases, there was 1 parietal presentation, 1 case of hydrocephalus, and in 2 cases the rupture was caused by the shoulders. And in these cases there was not one of total rupture.

As regards the pain of the incision, it is scarcely to be mentioned in comparison with that caused by the contractions of the uterus and the pressure of the head on the vulva. Furthermore, by favoring the disengagement of the fetal head, the incision saves the woman a number of pains, and is therefore rather indicated than contraindicated.

As regards the ultimate deformity of the vulva arising from the cicatrix consequent upon the incision, the authors of the paper state that Balandin has greatly exaggerated the inconveniences in saying that the vulval orifice is deformed, that it is made to gape, and that the floor of the pelvis is markedly enfeebled. This vulvar insufficiency never reaches the degree found after spontaneous rupture, when uncured or badly cared for.—*Archives de Tocologie*, November, 1884.

Hot Uterine Douches in Post-Partum Hemorrhage.

Dr. CARL REGNAULT, of Stuttgart, says, in an article on this subject, that since the contributions of Schülein, and especially of Richter, as to the results of the use of hot intra-uterine douches in post-partum hemorrhage, only a few have been found who have raised objections to them.

Of 2398 cases of labor at the Landeshebammschule, in Stuttgart, in the last five years, there were 108 cases (4.3 per cent.) in which hot intra-uterine douches were used *post partum*; cold intra-uterine douches were not used. Of the 108 cases there were 80 of hemorrhage; in 28 the hot douches were used on antiseptic grounds. For the douches two quarts of a 1 or 2 per cent. carbolic solution at 117° to 122° Fahr. In those cases in which the cervix was not sufficiently large to allow the passage of a glass tube, Fritsch's catheters were used. The return of the injected fluid was always free and unhindered. In a few cases a 1 : 4000 solution of corrosive sublimate was used. In no case were these symptoms of intoxication from the disinfecting agent, whether corrosive sublimate or carbolic acid was used. This may have been due to the fact that the injections were seldom repeated; in the greater number of cases, especially of hemorrhage, only one injection was used.

The accompanying, or usually previous treatment in these cases was the use of one or more injections of ergotin solution, and always more or less powerful kneading of the uterus. In 16 cases in which hot douches were used for a slight or medium degree of hemorrhage, no ergotin was given. In 3 of these cases blood-clots or a bloody flow was seen in the same afternoon, after the use of the hot douche, and in 3 others on the 2d, 3d, and 4th days. Also, one-third of all cases of after-bleeding occurred in those 16 cases treated without ergotin. There were also 4 cases in which ergotin alone was at first depended on to arrest fierce hemorrhage; but it was found that the hot water must be used. These 4 cases very well illustrate the value of the combined treatment. From the effect of the hot douches in these cases it may be concluded that the contraction of the uterus is due less to the thermal irritation of the injection than, as Richter holds, to an œdematous soaking-through and swelling of the mucous membrane and submucous tissue, depending on the inflammatory irritation, and that compression of the bleeding vessels is caused by the accession of a good contraction of the uterus.

The indications for washing out the cavity of the uterus are of two kinds : either for disinfecting purposes, or for controlling hemorrhage. In a considerable number of cases both indications are present. Injections for disinfection are made after delivery when the temperature becomes febrile, in cases of foul liquor amnii or lochia, in cases of death of the fœtus during delivery, and on prophylactic grounds in all cases in which examination of the cavity of the uterus is demanded. Injections for controlling hemorrhage are made in cases of simple atony of the uterus, or when the membranes and placenta are retained ; the latter indications do not often occur. In such cases the cavity of the uterus must be thoroughly cleaned out, except in cases of abortion, when the narrowness of the cervix prevents the introduction of the hand.

In case of hemorrhage in the late days of childhood, cold douches should be used, with ergotin subcutaneously and internally, and the application of ice-bags.

As regards the results of the hot douche treatment of hemorrhage, it is worthy of remark that in none of the 80 cases of hemorrhage was there any considerable after-bleeding : of these 80 cases there were 36 of severe hemorrhage ; and there were 18 cases in which it was very slight, 6 of which were treated without ergotin. These cases of post-partum hemorrhage were partly of fluid blood, partly of the passage of clots. Two cases of hemorrhage occurred on the 12th and 14th days after delivery, the others usually on the same day, or within the first six days. As regards the number of irrigations necessary in any case, there were seven cases in which a second douche was given on account of severe atonic hemorrhage. The second injections were made ten minutes after the first as a rule ; in one case one hour after the first. Richter states that there is an absence of blood in the lochia after the use of the hot douches ; but Regnault cannot confirm this from his own experience. Richter also states that the application of an ice-bag after the hot douching predisposes to hemorrhage, which is also contrary to the experience of Regnault. Another good result of the hot douche is the increased bodily temperature which follows it, the early improvement in the state of the pulse and of the general state. And it is noteworthy that Regnault has not seen a single case in which any unfavorable symptom could be attributable to the use of the hot douche.—*Centralbl. für Gynäkologie*, October 4, 1884.

Diverticulum of the Bladder in a Woman ; Urethral Ectasia or Vaginal Urethrocele.

Professor CARL SANTESSON, of Stockholm, describes a case of this rare affection, which he treated in 1861.

The patient, æt. 48 years, had twice been pregnant, the labors being very difficult, though in neither case were instruments used. The second child was born twelve years before she presented herself for treatment. She dated her trouble to a period soon after the second labor. The first symptoms were itching and a feeling of heat in the vagina, pain in the vagina on coition, and whenever she did exhaustive work ; there was also difficulty in micturition, and an alternation of retention and incontinence of urine.

On examination the anterior vaginal wall was found depressed at the vaginal orifice, above the urethral promontory and behind the urethra, where was found a smooth, elastic tumor, as large as a nut. There was nothing else abnormal about the vagina or uterus. The tumor consisted of a long pouch, about $1\frac{2}{3}$ inch long, and $\frac{3}{10}$ inch wide ; it communicated with the urethra by an opening situated at the junction of its upper and middle third, which was sufficiently large to admit a No. 16 sound. Pressure on the tumor caused no urine to flow out

through the urethra; the urine returned to the bladder. A catheter introduced along the anterior wall of the urethra passed into the bladder without difficulty. When the beak of the catheter was turned downwards, it went into the pouch, and could not be introduced further. If the desire to micturate was not immediately satisfied, the patient was unable to retain her urine; it escaped involuntarily, and caused considerable pain. The urine was acid, the sp. gr. 1.014, slightly mixed with mucus, but contained no abnormal matters.

As the patient could not then submit to a radical operation, Santesson first used the silver cautery on the interior of the urethra, between the bladder and the pouch, and subsequently cauterization of the vaginal surface of the tumor with fuming nitric acid, and thus, by making an eschar, reduced its volume. This treatment gave temporary amelioration, the tumor was reduced, and there was no more incontinence; the patient was able to retain her urine for two or three hours whilst walking, and just as long at night.

Three years and a half later she returned for further treatment, the old troubles having returned. Santesson excised an elliptical piece from the vaginal mucous membrane over the tumor, and united the borders with sutures. A part of the mucous membrane became gangrenous, but the cicatrix was so much larger and more resistant. The wound was completely cured in about five weeks, and the cicatrix looked like a small tumor about the size of the end of the finger.

Santesson has been able to find only six similar cases in literature, reported by Foucher, Gilette, and Duplay, in France; Priestley and Lawson Tait, in England; and G. Simon, in Germany. It seems very improbable that the affection is so extremely rare; and the paucity of the literature would seem to be due to the fact that cases are overlooked. As regards their origin and etiology, they may be classified as congenital and acquired ectasia; the first depending on a vicious development, as when the vagina opens into the urethra, and being obliterated at a certain distance from this canal, forms a diverticulum communicating with it; or when an incomplete development of the urethra gives rise to a greater or less solution of continuity in some part of its wall. As regards the varieties of acquired ectasia, Santesson draws a distinction between that formed by partial dilatation of an otherwise normal urethra, and without solution of continuity; and those due to the fact that a pre-existing cavity (as open abscess or cyst), situated behind the urethra, has communicated with its calibre. To the first he gives the name *diverticula vera*, to the second *diverticula spuria*.

The diagnosis must depend upon a most careful examination. Santesson considers the plan of treatment proposed by Foucher, that of making two elliptical incisions over the most prominent part of the tumor, as the best, and the only one which is rational. This operation he performed in the case reported. The diverticulum should be completely opened, and the edges of the wound closed with sutures over a catheter introduced into the urethra. Care should be taken, however, that the external and internal orifices of the urethra be not involved in the incision.—*Nordiskt Medicinskt Arkiv*, Bd. xvi., Hft. 4.

The Treatment of Retro-Uterine Hæmatocele.

In a paper published in a recent number of the *Archiv für Gynäkologie*, Dr. PAUL ZWEIFEL advocates more frequent interference with these effusions than has hitherto been considered good practice. It seems to us, however, that the facts he adduces do not strongly, if at all, support his contention. He advises incision per vaginam, under antiseptic precautions, followed by frequent washing out of the cavity in which the blood has been contained. He relates four cases

of his own in which this practice was followed; three got well and one died. He quotes from other sources 24 cases treated by incision *per vaginam*, of which five died. In two of these cases death occurred by sudden collapse following the washing out which Dr. Zweifel recommends. As he thinks the washing out was not done in these cases in a proper manner, our author eliminates these two, and reckons, including his own, four deaths out of 26 cases, or a mortality of 15.3 per cent. In our view, however, the two omitted cases ought by all means to be lost sight of, for they prove that the washing out of such cavities is not a thing to be done with perfect confidence in its safety. Our own impression is that most cases do just as well without it. Dr. Zweifel then adduces a collection of 66 cases treated by puncture, with 10 deaths, or 15.1 per cent.; a result much the same as that gained by the practice of incision. Bearing in mind the fatal cases of injection, puncture seems to be the safer practice. Lastly, Dr. Zweifel gives for comparison a collection of 129 published cases treated on the expectant plan, with a mortality of 18.4 per cent. But it must be remembered that published cases available for comparison contain an undue proportion of fatal cases, and of cases in which the hæmatocele discharged into a mucous tract; for it is only in such cases that (independently of treatment) the diagnosis is certain. It is familiar to every gynæcologist that small pelvic tumors, accompanied with the history and having the signs of hæmatocele, are very common, and generally get soon well, the mortality among such cases (of which the diagnosis, although not scientifically certain, is yet as sure as that of the cases calling for operation) being nothing like 18 per cent. We regard Dr. Zweifel's figures, combined with daily experience, as confirming the old rule, not to meddle with hæmatoceles unless urgent symptoms, either of pressure or pyrexia, are present. We agree with him that, if we do anything at all, a free incision is best; but the subsequent washing out adds a new source of danger, and, if free exit for discharge be maintained by a drainage-tube, is not required. If an India-rubber tube will not keep open, a glass one can be used.—*Med. Times and Gazette*, November 8, 1884.

Myomotomy.

In a paper on this subject, read in the Gynæcological Section of the Eighth International Medical Congress, MARTIN, of Berlin, said that the symptoms which indicate a more or less active treatment of uterine myomata are hemorrhage, symptoms of pressure on the neighboring pelvic organs, disposition of the mucous membrane covering the myoma towards malignant degeneration, circulatory disturbances, and heart-weakness. He has used ergotin in many cases, and is very much pleased with the results. He has performed castration in five cases, and had favorable results, as has Wiedow, in the Freiburg clinic. He finds, however, that the operation for the removal of myomata may be performed *per vaginam*; this is a difficult method unless the myoma has a polypous development, but it is not a dangerous operation. Martin has operated ten times for myoma of the uterine wall, and twice for myoma of the cervix. Of the first ten cases eight recovered; one died of sepsis, the second of hemorrhage.

Martin recognizes that laparotomy is much the easiest of the operations. He has performed laparotomy 14 times for subserous myomata; 2 died of sepsis, and 1 of collapse; 1 from septic degeneration of the myoma, and 2, very anæmic, of collapse. He has removed large myomata *per vaginam* 33 times. The first 6 died of septic infection from incomplete antisepsis; of the succeeding seven only 2 died of sepsis, 1 of these being anæmic. In the remaining 20 drainage through Douglas's pouch was made; of these 1 died of embolism, 2 on account

of too long delay in operating, and 3 of sepsis; 1 of the latter from degeneration of the myoma. The supra-vaginal operation was performed 5 times on account of carcinoma and sarcoma; 5 operations were performed for subserous intraligamentous myomata; 1 death from sepsis, 1 from collapse. Martin declares that if the operation is performed in the course of symptomatic treatment, it should be performed as soon as possible. The greatest danger in the operation is from septic infection, especially during the period of convalescence. On this account he strongly advises drainage through Douglas's pouch.

LÖWENTHAL recommended the old method of incising the anterior wall in intraperitoneal myomata in order to reach the seat of development. He has recently performed this operation in two cases.

WINCHEL asked Martin as to his views of the ergotin treatment. He himself thinks that it must be given for some time, and in large doses. As to the indications for laparotomy, he thinks that no hard and fast line can be drawn.

FEHLING has used ergotin very extensively, but he is now more careful with this drug, since he has seen degeneration of the myoma in two cases under its use. He regards it as of especial value in cases of rapidly growing cavernous myomata, which increase at the menstrual periods.

HOFMEIER said that the prognosis of the operations depends, to a considerable extent, on the anatomical situation of the tumor. The prognosis is very favorable if the uterine cavity be not opened. Of 20 cases he has had only 1 prove fatal. Of 35 cases, in which the cavity of the uterus was opened, 8 died. Subserous development of the tumors makes the prognosis much graver; of 21 such cases 12 died. He thinks that to prevent sepsis the cervix should be energetically disinfected, and its mucous membrane deeply incised.—*Centralbl. für Gynäk.*, October 18, 1884.

— Intrauterine Medication.

At the close of an introduction to a discussion in the section of obstetric medicine at the fifty-second annual meeting of the British Medical Association, Dr. LOMBE ATTHILL drew the following conclusions:—

1. Carbolic acid, in the proportion of one part of spirit to two of the acid, is the safest and most generally useful of all the agents employed.
2. Carbolic acid should always be applied by means of a probe, round the point of which a layer of cotton is rolled, the cotton being carried up to the fundus at least twice on each occasion that the applications are made, which should be on every third or fourth day, till marked improvement takes place.
3. Carbolic acid should never be injected into the uterus, except when combined with iodine, in the form known as iodized phenol.
4. In many cases, iodized phenol may with advantage be applied by means of a probe.
5. In cases in which metrorrhagia or profuse menstruation occurs, depending on an unhealthy condition of the intrauterine mucous membrane, the cavity being dilated and the uterus enlarged, from half a drachm to a drachm of iodized phenol may be injected with great advantage.
6. In cases in which epithelioma attacks the mucous membrane of the cavity, the injection of iodized phenol promises better results than any other treatment.
7. The success likely to follow the injection of iodized phenol renders the dilatation of the uterus, the use of the curette, and the subsequent application of fuming nitric acid, less frequently necessary than has been the case hitherto.
8. The injection of iodized phenol requires to be carried out with so much care, that it should never be injected except by means of a syringe which will not contain more than one drachm.

9. The use of the fuming nitric acid should be limited, as a rule, to those cases in which dilatation has been practised, and it should always be applied through a tube, inserted into the cervix uteri for the purpose of protecting the sides of that canal from the action of the acid.

10. The pain produced by the application of any medical agent to the intra-uterine cavity does not bear any relation to the activity of that agent, but is due to one of two causes—either to hyperæsthesia, or to narrowness of the cervical canal, especially of the os internum.—*British Med. Journ.*, Nov. 29, 1884.

The Alexander-Adams's Operation for Shortening the Round Ligaments.

Dr. WILLIAM GARDNER, of Glasgow, at the conclusion of a paper in which he reports six cases, says: The class of cases to which I would restrict the operation is the large one of chronic retroflexion with malposition of one or both ovaries, and if one, probably the left (as Lawson Tait has pointed out), owing to the absence of a valve in the left ovarian vein. In simple prolapse the removal of triangles from both anterior and posterior vaginal walls with restoration of the perineal body would, in most cases, enable the uterus to be kept in position by a pessary, and if this failed I should then be disposed to pull up the round ligaments. My method of performing the operation is as follows:—

After shaving the mons veneris and groins, I push the finger into the external abdominal ring, and mark the invaginated skin with the nail of my forefinger on each side. This marks the centre of my first incision, which may be prolonged either upwards or downwards if difficulties occur. The first incision I make two inches long, in the direction of Poupart's ligament, and parallel to it, dividing, at one stroke of the knife, skin, superficial fascia, and fat. Generally one or two small vessels require torsion, or the application of pressure forceps for a short time. I then define the ring thoroughly, and after finding the fibres of the round ligament, I follow them up until it becomes a strong round cord, upon which I fix pressure forceps.

The operation is then repeated on the opposite side till the same stage is reached. An assistant now passes his finger into the vagina and presses the os uteri backwards, whilst I gently but firmly pull up both ligaments until the fundus can be distinctly felt in its normal position through the parietes. The os will then be found directed slightly backwards. In most cases I pull out each ligament from $2\frac{1}{2}$ to 4 inches, and then tie them together, passing a folded pad of gauze under them to keep them on the stretch. I then pass sutures of kangaroo tendon through the skin and ligament, and also round the latter, and bring the edges of the incision closely together. A drainage-tube is passed under the ligament and brought out at the lower end of the incision. Listerian dressing is then applied in the usual way, and the operation may be done either with spray or without, according to the inclination of the operator. In either case the hands of the operator should be well washed, or soaked in carbolic lotion, and all instruments should be kept in carbolic lotion. For the first two or three days after the operation I keep the patient under the influence of opium sufficiently to abolish acute pain. The urine may be drawn off by catheter every four hours if necessary. The uterus ought never to be lifted with the sound at the operation, but should in all cases be drawn up by the ligaments alone, on account of the danger (probably remote) of setting up perimetritic inflammation. It must always be remembered that, previous to undertaking the operation, the uterus must be ascertained to be freely movable and capable of being replaced by the sound. It is not necessary to insert any pessary until the patient is allowed to get up. This may generally be allowed at the end of three weeks, and a well-fitting watch-

spring pessary is then the best support. After six weeks or two months this may be dispensed with.

The results of this operation, so far, have been excellent, and several of the patients have been transformed from a state of chronic invalidism to perfect health. Case I., of the private cases, had been a chronic invalid for five years, and since the operation she has been able to walk a distance of two or three miles at a time without inconvenience, and has been twice pregnant. This case also shows that when there is prolapse of both ovaries into Douglas's pouch with consequent sterility (owing to the impossibility of the fimbriated extremity of the Fallopian tube applying itself to the ovary), this may be remedied by the operation, and pregnancy follow. Another advantage gained by this operation is that it prevents the necessity for Tait's operation of removal of the "uterine appendages" when the ovaries are prolapsed with retroversion or retroflexion of the uterine body. The same result is thereby attained without the obvious disadvantage of the other operation—viz., that of preventing pregnancy in the future. All the difficulties of the operation can be surmounted by a course of operations on the dead body, and any inability to find and pull up the round ligaments is probably due to imperfect performance, as in my second hospital case, where I was only able to find one ligament. I can also imagine another difficulty, although I have never had the misfortune to have to meet it. It is that, owing to previous recurrent attacks of pelvic peritonitis, the ligaments may become so adherent to their peritoneal investments that they may not run when pulled upon. In such cases there would be left to the operator (if symptoms were sufficiently urgent) the *dernier ressort* of removing the uterine appendages from their prolapsed, and, probably, adherent position by Tait's radical operation.—*The Glasgow Med. Journ.*, November, 1884.

Ovariectomy, with Suture of the Base of the Tumor into the Abdominal Wound.

Dr. A. RHEINSTAEDTER reports, in the *Zeitschrift für Geburtshülfe und Gynäkologie*, Bd. X., Heft 2, 1884, seven cases of ovariectomy, in which the base of the tumor was sutured into the abdominal wound, with good result in every case. After giving the history of the cases, he concludes his paper with the following description of his operative procedure:—

The longitudinal incision is always quite extensive, and is often carried above the umbilicus. The peritoneum is immediately sutured to the edges of the wound. Immediately after this the presenting tumor is punctured and its size diminished, the incision being held open by the hand and the patient placed upon the back so as to favor the draining away of the fluid contents of the tumor. The opening of the puncture or of the incision into the cyst is then sutured, after which the tumor is gradually drawn out by means of dressing-forceps, the adhesions separated, tied and cut, until the greater part of the tumor has been drawn out of the abdominal wound.

If the exploring hand finds that there is no pedicle, that the tumor is inserted to the broad ligament by a large base, or if the adhesions to the abdominal walls, to the bladder, the uterus, rectum, etc., are such that total extirpation appears too dangerous, he proceeds to suture the base of the tumor into the lower part of the abdominal wound, after having closed the upper part of the wound around the base of the tumor as completely as possible with silver sutures. The sutures which fix the wall of the base of the tumor to the abdominal wall are of solid carbolized silk, and are placed around the base *parallel* to the edges of the wound, at a distance of about 2 cm. from the border. During the application of the sutures the tumor is held up by an assistant, whilst another protects the intes-

tines, holding them with cloths wrung out in warm chlorine water. The needle is first carried through the abdominal wall from without inwards, then carried through the wall of the tumor, then back from within outwards. With each suture the operator takes in about 4 cm. of the wall of the tumor. The sutures are applied as rapidly as possible.

When the tumor is completely sutured in it is found that the abdominal wound is closed, and that the peritoneal surfaces are in contact. The sutures which were put in at an early stage of the operation to fix the peritoneum, may now be removed. The tumor is now cut off close to the abdominal wall; a very simple operation when the cyst is unilocular. If it is multilocular and the vessels of large size, a double ligature may be passed through the base and tied on each side before the tumor is cut off, in order to prevent hemorrhage.

The cleansing of the sac is to be done with the hand for the most part, so as to remove the solid matters of the tumor. Sometimes, when they are very adherent to the sac wall, or when there is considerable hemorrhage, they may be ligated; the two sides may be tied and then excision performed. When the ovarian elements are removed, the edge of the wound in the sac may be sutured again to the cutaneous surface by a perpendicular suture of carbolized silk. A drainage-tube is then put in place. At the present time the author establishes drainage without passing a drainage-tube to the bottom of the sac, through Douglas's sac and the vagina, being convinced that lateral decubitus is sufficient to cause the secretions to drain away. After drainage is established, the sac is tamponed with iodoform gauze. The remainder of the compress bandage is composed of salicylated tow or wadding, and of bands of gauze steeped in carbolized water.

As regards the after-treatment, the sutures uniting the walls of the sac to the edges of the abdominal wound are removed as soon as a gangrenous point appears on the skin; sometimes this is necessary on the day after the operation. The union of the peritoneal surfaces is solid within about twenty-four hours. The tampons are removed on the first day, and replaced by fresh iodoform gauze. The dressing is renewed every day, and the drain washed with weak chlorine water. During the first few days after the operation the inner wall of the sac is of a grayish-yellow color. This layer falls off by suppuration, and is replaced by red granulations which tend to unite. If suppuration is tardy, a mixture of wine of camphor and tincture of myrrh may be used, tampons of wadding soaked in it and applied to the grayish-yellow surface. Union of the cyst-walls is further favored by bringing together the edges of the abdominal wound by means of straps of adhesive plaster. Within about five days, as a rule, all the sutures are removed, and the size and extent of the drain are progressively diminished as union takes place.—*Archives de Tocologie*, November, 1884.

Gonorrhæal Disease of the Uterine Appendages and the Operative Treatment.

SÄNGER, of Leipzig, read a paper on this subject before the Society of German Naturalists and Physicians, in Magdeburg. His opinion is that gonorrhœa in the female, and the affections of the uterine appendages connected with it have not yet received the attention due them. Gonorrhœa furnishes a far higher percentage of severe chronic affections of the pelvic organs than puerperal fever, and a far higher percentage of severe incurable cases than syphilis. The frequency of gonorrhæal affections is so great that about one-ninth of all gynæcological cases, or even more, is primarily caused by it. As regards the severity of the forms, it depends very much upon the coincident affections of the tubes and ovaries, and of the pelvic peritoneum. The principal centre is to be found in the tubes; with

the exceptions of simple catarrh, and of hydro- and hæmato-salpinx, the severe forms of tubal disease are only of an infectious nature; and in this may be reckoned septic salpingitis, which may be either puerperal or non-puerperal; in each case it extends from the vagina, cervix, or uterus. There are, furthermore, a tuberculous, a syphilitic (Bouchard, Lépine), and an actinomyotic (Zemann) salpingitis; but the gonorrhœal is unquestionably the most frequent form. There is also a mixed form, a puerpero-gonorrhœal salpingitis. After parturition or an abortion, the results of a recent or an old gonorrhœa are seen in a sudden attack of salpingitis.

As has already been stated, gonorrhœal salpingitis, giving rise to an acute or chronic inflammation, or to pyosalpinx, is a chief cause of severe disease of the uterine appendages and the pelvic peritoneum. Sânger cannot accept Noeggerath's division of perimetritis into an acute, relapsing, or chronic form; he classifies gonorrhœal affections as urethral, vesical, and renal: those of the vulva and vulval glands; vaginal, and uterine (gonorrhœal catarrh); and of the uterine appendages, which he again classifies as gonorrhœal disease of the tubes (salpingitis, pyosalpinx, peri-salpingitis; of the ovaries (perioöphoritis, ööphoritis and abscess of the ovary); of the broad ligaments (inflammation of the cellular tissue, parametritis and abscess formations). These forms of disease may be either unilateral or bilateral, and there may also be a coexisting perimetritis; they may result in pelvic peritonitis, or in diffuse perimetritis. They may be either acute or chronic.

As regards the diagnosis of gonorrhœal diseases in women, it seems that since the discovery of the gonococcus of Neisser, this should determine the diagnosis in doubtful cases; although the latest researches of Bumm seem to render this somewhat uncertain. It seems, however, that there can scarcely be a doubt as to the microbic nature of gonorrhœa. As far as concerns the infectiousness of latent gonorrhœa, Sânger thinks it not improbable that this is determined by the presence of spores of permanent form, a special form of the gonococcus; more especially since permanent forms of other bacilli, as of splenic fever, are known. In order to limit the frequency of gonorrhœal infection in women, Sânger recommends a general prophylaxis; the dangers of gonorrhœa, he thinks, should be plainly stated to the public; and a married person should be especially warned against intercourse until all traces of the disease are thoroughly eradicated. He mentions a case in which a man had had gonorrhœa ten years before, and still had prostatitis; the wife took gonorrhœa and became sterile. Special prophylaxis should consist in the strictest treatment of infected women; and he thinks it advisable to inject Credé's nitrate of silver solution into the fossa navicularis of the man after impure intercourse, as is done in the Leipzig clinic.

For the treatment of gonorrhœa, Sânger recommends the daily use of injections of corrosive sublimate solution, one per cent. After this has been used for some time, nitrate of silver solution may be used, with tincture of iodine or dilute nitric acid. These should also be injected into the cavity of the uterus. As regards the treatment of diseases of the uterine appendages dependent upon gonorrhœa, Sânger advises extirpation of the appendages; it is especially important, for the after-results of salpingotomy, that the tubes be thoroughly removed. This operation has been quite frequently performed recently for pyosalpinx; and castration with removal of larger or smaller portions of the tubes still more frequently for ööphoritis and perioöphoritis. In such cases a combined operation, a salpingo-ööphorectomy, is often necessary. Sânger mentioned four cases in which the combined operation had been performed. In one case the results were perfect, and the patient was entirely freed from pain; the second and third cases resulted well; the fourth was but little benefited.

Fränkel, of Breslau, said that he had made quite a number of examinations in the Freiburg Clinic with reference to the gonococci. Naturally the case is simple enough, if they are found in large numbers. But when only a few or single cocci are found, as is often the case in chronic latent gonorrhœa, or when, after repeated examination of the genital passages and of the secretion, at different times, no cocci are found at all, there must necessarily be considerable doubt. Certainly in old, chronic forms, in which the clinical symptoms have disappeared, the confirmation of the diagnosis by means of the microscope is desirable; and it is just here that we may fail to find gonococci. There are some cases, especially in children, in which the cocci are not so very scarce in the secretion of the vulva and vagina, and yet give rise to no infection on the most complete experiments. It seems, therefore, that the clinical symptoms, as most clearly presented in the vulva, the vulval glands and their ducts, and on the part of the uterus and its appendages, are always the most certain and clear. Nevertheless, the central microscopical examinations of the secretion in every case are not only desirable, but necessary. From the results of Bumm's careful researches, and his differentiation of various kinds of gonococci it seems that there are, perhaps, in the genital secretions of the female, cocci of different value or dignity; and which of these are active and capable of infecting can only be determined by inoculation experiments on the genital mucous membrane of men or monkeys. He asked Säger whether, since he designated infection as the cause, without exception, of inflammation of the tubal mucous membrane, he would deny the catarrhal salpingitis with its consecutive hydrosalpinx. This is with difficulty diagnosed, by examination, from purulent salpingitis, but after longer observation of the clinical course of the case it is seen that the accompanying inflammatory phenomena, perisalpingitis, oöphoritis, perioöphoritis and perimetritis, are usually absent in the simple catarrhal form.—*Centralb. für Gynäkol.*, October 11, 1884.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

The External Pistol-Shot Wounds.

Dr. D. B. N. FISH, of Amherst, at the close of a paper on this subject, read before the Massachusetts Medico-Legal Society, gives the following summary: The distance at which a pistol-shot has been fired may be estimated by the following general rules:—

(1) From a great distance the entrance wound will usually be large and irregular; there will be absence of any great degree of lividity of its edges, and absence of the marks of powder. The wound of exit, if one is present, will usually be larger than the wound of entrance. At any distance the edges of wounds of entrance will usually be inverted, those of exit everted.

(2) From a short distance the entrance and exit wounds will generally be nearly equal in size; the edges of the former will be blackened, and powder grains will be imbedded in the skin, but there will be absence of scorchings and brandings of powder.

(3) Close to the body the entrance wound will generally be larger than the exit. There will often be, in addition to the tattooing of the skin by unburned grains of powder, a mark or *brand* made by the flame of the gases and of the burning powder, by the soot of the partly burned powder, and by the residue or ash of the wholly burned powder. As a rule this *brand*, which may consist of a

burning alone of the hair, the skin, or the clothing, or of a burning and blackening of the skin or clothing, will appear at one side of the bullet hole.

The *direction* of the shot will be shown in part by the trajectory of the ball—a subject of which this paper does not treat—and by the location of the wound of entrance. The character of the opening, whether rounded or oval, may give some indication of the angle at which the weapon has been held.

The *position of the weapon* (and whenever this term is used I wish to be understood to mean not its angle to or distance from the body, but the manner or position in which it is held; that is, whether it is held with its hammer and sight above the barrel, as in the usual position for firing, or with the hammer and sight below the barrel, as when the weapon is turned upside down, or in any other position of the hammer and sight relative to the barrel of the weapon) the *position of the weapon* is to be determined by the following rule: When the *brand* appears upon the hair, the skin, or clothing, at one side of the bullet hole, hold the weapon with its muzzle to the bullet hole so that the line of its hammer and sight will meet a line drawn from the centre of the bullet hole through the centre of the *brand*, and it will show the exact position of the weapon when fired.

This rule is deduced from the newly-discovered fact that, owing to the recoil of the muzzle of the weapon in the direction of its sight, this *brand*, when it appears at one side of the bullet hole, will appear upon that side which corresponds to the side of the hammer and sight in their position relative to the bore or barrel of the weapon. That is, if the weapon is held upside down the *brand* will appear below the bullet hole.

Accidental wounds are generally near wounds. When inflicted from a distance they cannot be distinguished from homicidal wounds. In shots fired near by, when a person is known to have been shot while standing, an unnatural position of the weapon, as shown by the location of the *brand*, will tend to corroborate a claim of accidental shooting. So, if one is known to have shot himself, an unnatural position of the weapon will show that the shot was probably accidental. The location of the wound and the course taken by the ball may also characterize the wound as accidental.

Homicidal wounds inflicted within the suicide limit have heretofore been distinguished from suicidal wounds alone by the location of the wound and by the uncertain evidence presented by the trajectory of the ball. When the location of the wound has been such that a person might easily have inflicted it upon himself, there have been no means of determining from its character whether it was homicidal or suicidal. To aid in distinguishing between such wounds, I offer the following rule: When the location of the *brand*, relative to the bullet hole, shows that the weapon has been held in a position of its hammer and sight impossible or improbable for a suicide, it is probable that a murder has been committed. Certain relative locations of this *brand* may also indicate that the victim has been shot while in a reclining position.

Multiple wounds are usually homicidal, but may be either accidental or suicidal.

Shots fired beyond the usual suicide limit are probably homicidal.

Suicidal wounds. It is said that the suicide rarely holds the muzzle of his pistol at more than eight inches from the body. Suicides generally fire at the side or front of the head, next at the heart; they sometimes fire at the back of the head.

The distance from the body at which the weapon must be held to show the *brand* plainly, is, probably, very nearly as follows: for small pistols and revolvers, not over four to six inches; for large weapons of this class not over twelve to fourteen inches.—*Boston Med. and Surg. Journ.*, Oct. 2, 1884.

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The following works have been received for review:—

Das Sauerstoff Bedürfniss des Organisms von Dr. P. ENRICH. Berlin: August Hirschwald, 1885.

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Case in which attacks of Intermittent Tonic Muscular Spasm immediately followed by complete Temporary Paralysis have frequently and periodically recurred during the entire life of the Patient, the Health in the intervals being Normal. By A. HUGHES BENNETT, M.D., Physician to the Hospital for Epilepsy and Paralysis.

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- Cerebral Localization in Relation to Insanity, with cases. By J. M. CARNOCHAN, Member of the Medico-Legal Society of New York. New York, 1884.
- The Family System as an Accessory Provision for our Insane Poor. By HENRY R. STEADMAN, M.D., Boston.
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- Typhoid Fever and Low Water in Wells. By HENRY B. BAKER. Lansing, Michigan, 1885.
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- Experimental Researches on Cicatrization in Bloodvessels. By N. SENN, M.D., of Milwaukee, Wisconsin.
- The Physiological Action of Cocaine on the Common Frog, with Special Reference to its Action on Organs and Tissues. By HERMANN BIGGS, A.M., M.D., New York. Greifswald, 1885.
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The following Journals have been received in exchange:—

Γαλλικός. Bibliothek for Læger. Kronika Lekarska. Annali Universali di Medicina e Chirurgia. Annali Universali di Medicina e Chirurgie (parte rivista). Gazzetta degli Ospitali. Upsala Lakareforenings Forhandlingar. Gazzetta Medica di Torino. Rivisit. Veneta di Sci. Med. Cronica Medico-Quirurgica de la Habana. Uniao Medico. La Union Medica, Caracas. La Medicina Contemporanea. Eco Cientifico de las Villas.

Allgemeine Wiener med. Zeitung. Archiv für Gynækologie. Berliner klinische Wochenschrift. Centralblatt für Chirurgie. Centralblatt für Gynækologie. Centralblatt für klinische Medicin. Centralblatt für die medicinischen Wissenschaften. Centralblatt für die gesammte Therapie. Deutsches Archiv für klinische Medicin. Deutsche medicinische Wochenschrift. Fortschritte des Medicin. Medicinisch-Chirurgisches Centralblatt. Monatsheft für prak. Dermatol. Wiener med. Presse. Wiener Klinik. Zeitschrift für physiol. Chemie. Zeitschrift für Klin. Medicin.

Annales de Dermatologie et de Syphiligraphie. Annales de Gynécologie. Annales des Maladies Genito-Urinaires. Annales des Mal. de l'Oreille, etc. Annales de la Société de Médecine d'Anvers. Archives de Méd. et Pharm. Militaires. Archives de Toxicologie. Archives Générales de Médecine. Bulletin Générale de Thérapeutique. Gazette Hebdomadaire. Gazette Médicale de Nantes. Gazette Médicale de Paris. Gazette Médicale de l'Orient. Gazette Hebdomadaire de Montpellier. Journal de Médecine de Paris. L'Abeille Médicale. L'Encéphale. Le Progrès Médical. L'Union

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The Asclepiad. Brain. Braithwaite's Retrospect. British Medical Journal. Dublin Journal of Medical Science. Edinburgh Medical Journal. Glasgow Medical Journal. Journal of Anatomy and Physiology. Journal of Mental Science. Lancet. Liverpool Medico-Chirurgical Journal. London Medical Record. Medical Chronicle. Medical Times and Gazette. Midland Medical Miscellany. Ophthalmic Review. Practitioner. Quarterly Journal of Insanity. Australian Medical Journal. Indian Medical Gazette.

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ARTICLE I.

MEMBRANOUS CROUP; DIPHTHERITIC CROUP; TRUE CROUP. By J. LEWIS SMITH, M.D., Clinical Professor of Diseases of Children in Bellevue Hospital Medical College, New York, etc. etc.

THE term pseudo-membranous laryngitis, or laryngo-tracheitis, or true croup is applied to a common and fatal disease, the essential anatomical character of which is inflammation of the larynx, or larynx and trachea, with the formation of a pseudo-membrane upon its surface. It occurs most frequently between the ages of two and twelve years, but infancy after the age of six months and early manhood are not exempt from it. For brevity I shall use the term croup in the following pages to indicate this form of inflammation, although recognizing another form of croup, the spasmodic or catarrhal, in which no pseudo-membrane occurs.

Etiology.—Wherever diphtheria prevails as an endemic or epidemic, it is well known that a large majority of the cases of membranous croup are local manifestations of this disease, and this inflammation is therefore in such localities commonly designated diphtheritic croup. Physicians have endeavored to discriminate between croup due to diphtheria and that from other causes; but whatever the cause, the anatomical characters, the clinical history, and the required treatment are so nearly identical that attempts to differentiate the disease when produced by other agencies than diphtheria from that due to diphtheria, have proved futile and unsatisfactory in localities where diphtheria occurs, except in a few instances, as, for example, when croup has been manifestly caused by swallowing or inhaling some irritating agent.

Inflammation of the laryngeal and tracheal surface, whatever its cause, whenever it reaches a certain grade of severity, may be attended by the

exudation of fibrin and the formation of a pseudo-membrane, but such a result more frequently occurs in the inflammation caused by diphtheria than in that produced by other agencies. In diphtheria a moderate laryngo-tracheitis is attended by the pseudo-membranous formation.

The percentage of cases of diphtheria in which the larynx becomes implicated and croup occurs, varies in different epidemics and in different seasons and localities. In epidemics of a mild type, the cases appear to be fewer in which the larynx is involved than in epidemics of a severe form. In New York the percentage is large. From December 1, 1875, to July, 1878, I preserved records of all the cases of diphtheria which came under my notice. The number was 104, and in twenty-five of these, or about one in four, croup occurred, producing the usual obstructive symptoms, and constituting the chief source of danger. During the two and a half years embraced in these statistics the disease was usually severe. In the last five years amelioration has occurred in the type of diphtheria in this city, and the proportion of croup cases has not been so large.

So commonly is membranous croup, when occurring in a locality where diphtheria is endemic or epidemic, a local manifestation of diphtheria, that physicians in such localities come to regard every case of this disease of the larynx as produced by the diphtheritic poison. In New York physicians scarcely recognize any other form of membranous croup. It is well, therefore, briefly to recall the evidences that croup in a certain proportion of cases results from other causes than diphtheria. The occurrence of croup in localities where diphtheria is unknown, of course, indicates the operation of some other agency than the diphtheritic poison. Thus, in 1842, before diphtheria was established in this country, Dr. John Ware, of Boston, published his well-known paper on croup, and in 74 of the 75 cases embraced in his statistics the membranous exudation was present upon the faucial surface. The statistics relating to the introduction of diphtheria into New York City, and the recorded death statistics of this city, have been annually published, and each year more or fewer deaths from croup have been reported. The first death from diphtheria in this century, within the city limits, certified by a physician, was that of a German woman, at 638 Hudson Street, on February 15, 1852. Two other fatal cases occurred in 1857, and since then the deaths from croup and diphtheria have been as shown in the following table:—

Year.	Croup.	Diphtheria.	Year.	Croup.	Diphtheria.
1858 . . .	478	5	1867 . . .	338	251
1859 . . .	622	53	1868 . . .	342	276
1860 . . .	599	422	1869 . . .	483	328
1861 . . .	460	453	1870 . . .	421	308
1862 . . .	685	594	1871 . . .	466	238
1863 . . .	908	981	1872 . . .	675	446
1864 . . .	754	781	1873 . . .	732	1151
1865 . . .	449	534	1874 . . .	594	1665
1866 . . .	368	435	1875 . . .	758	2329

Since 1875 weekly bulletins were issued instead of the annual reports.

Thus, in the first years after the introduction of diphtheria, the deaths assigned to croup so greatly outnumbered those of diphtheria, as in 1858, when five died of diphtheria and four hundred and seventy-eight of croup, that it is evident that most of the cases of croup in those years were attributable to other causes than diphtheria. Since, as we have stated, any inflammation of the surface of the larynx and trachea, if sufficiently intense, may produce a pseudo-membrane, croup may occur as a primary disease, and as a complication of various maladies. According to my observations in New York City, the chief causes of croup, arranged in the order of frequency, would be about as follows: diphtheria, "taking cold," measles, pertussis, scarlatina, typhoid fever, irritating inhalations. I have, elsewhere, related cases of scarlet fever of severe type, in which a thin film of pseudo-membrane was found upon the surface of the larynx and trachea, and there was no other lesion to indicate that diphtheria had supervened. The croup was, to all appearances, caused by the scarlatinous and not the diphtheritic poison. The following was a case in which croup was apparently idiopathic, and produced by that common cause of inflammations of mucous surfaces, to wit, exposure to sudden atmospheric changes:—

CASE.—At midnight, on October 22d, 1884, I was summoned to a child aged 25 months, who had been in the street till nearly nightfall, when the weather suddenly became much cooler, and he was brought home. At 11.45 P. M. he awoke with a harsh voice and croupy cough so as to alarm the family. I found the axillary temperature normal, but the fauces were injected, and the diagnosis was made of spasmodic or catarrhal croup. Emesis was produced by syrup of ipecacuanha; the croup kettle, and a mixture of potassium chlorate and ammonium chloride were ordered.

On the following day he walked around the room and seemed better, but the inhalation of the vapor of lime from the croup kettle was continued. At 7 P. M. the symptoms became aggravated, the cough was frequent and hoarse, temperature (axillary) $100\frac{1}{2}^{\circ}$, pulse 120, and respiration noisy. At my visit the post-clavicular, supra-sternal, infra-mammary, and epigastric regions were depressed in each inspiration, though only in a moderate degree; face flushed, fauces injected but without pseudo-membrane. The aspect was now more serious on account of the increasing dyspnoea. The pulse was strong, and no pseudo-membrane was visible; the temperature, in the groin, was scarcely 100° . Emesis had been produced before my arrival, and in the matter vomited was a pseudo-membrane with ragged edges, and about one-half an inch in length; examined within an hour subsequently under the microscope, it was found to consist of fibrillæ, evidently fibrous, some of them wavy, and inclosing many pus-cells. Ten grains of calomel were placed on the tongue, and inhalations of the following were almost constantly employed by the steam atomizer:—

R.—Liq. potassae, $\mathfrak{z}\text{ij}$;
Aq. calcis, $\mathfrak{z}\text{xij}$. Misc.

On the following day the respiration was easier, and within twenty hours the patient had so far convalesced as to be out of danger. There had been no case of diphtheria in the house, nor recently, as far as I could learn, in the immediate neighborhood.

That this was a local disease, non-specific, and quite distinct from the croup of diphtheria, cannot, I think, be doubted.

In considering the etiology of croup, and recognizing diphtheria as by far its most common cause, wherever the latter disease prevails, an interesting theory is suggested, to which Heubner alludes, who affirms that inflammations, even with the characteristic membranous exudation, may be set up without the micrococci and then inoculation by micrococci occur, and "induce the general disease" ("Die experimentelle Diphtheria," Leipzig, 1883, quoted in Ziegler's *Path. Anat.*, part ii. paragraph 444, Wm. Wood & Co., 1884). The point alluded to is that inflammations arising from other causes than diphtheria now and then become intensified, and rendered more protracted and dangerous by the reception of the diphtheritic virus after the inflammations are established. In support of this opinion it is well known by all who have had much experience with diphtheria, that those surfaces are prone to be attacked by the specific inflammation that are already irritated or inflamed when diphtheria is contracted. Hence the occurrence of the pseudo-membrane on recent wounds, upon the eyelids in cases of catarrhal conjunctivitis, upon the uterine surface after parturition, and upon the laryngeal, tracheal, and bronchial surfaces, if they are already inflamed as in measles.

Scarlatina is so often complicated by diphtheria that there seems to be a close affinity between the two diseases. It is a very common observation in New York city that scarlet fever continues two or three days, in its usual form, when the symptoms become suddenly aggravated and the aspect of the disease more severe. On inspecting the fauces a pseudo-membrane is discovered covering this region, and it probably appears also upon the nasal surface. Although severe scarlatinous inflammation may cause a fibrinous exudation, yet that diphtheria has supervened upon scarlet fever in a considerable proportion of cases which have the above history cannot, I think, be doubted. In a few instances in my practice (4) the fact that scarlet fever was complicated by true diphtheria, and the scarlatinous inflammations, first in order, were intensified by the presence and influence of the diphtheritic poison, was shown by the occurrence of diphtheria without scarlet fever in other members of the family.

In accordance with the above law we may assume that a child who has laryngo-tracheitis, so common from taking cold and manifested by cough and hoarseness, is more prone to have diphtheritic croup than is one whose air-passages are in their normal state when diphtheria commences. A supposed error of diagnosis is often made by physicians, always to their discredit, who diagnosticate catarrhal laryngitis, but find, after two or three days, that their patients really have diphtheritic croup. A considerable number of such instances have come to my notice, always with the ill-will of families towards their physicians. Now it seems to me that in

many of these cases the physicians have been right in their first diagnosis, and diphtheritic croup supervened on the catarrhal inflammation.

Another point relating to the etiology of diphtheritic croup requires notice. Many physicians, who have had ample opportunities to observe diphtheria, believe that the common way in which diphtheritic croup begins is as follows: The faucial or nasal surface is first affected, becoming covered by the pellicular exudation, and during inspiration particles of the pseudo-membrane, containing the specific principle, being detached, lodge in the larynx. At the point of inoculation the specific inflammation arises and extends. This may be the manner in which the croup of diphtheria begins in certain cases, but it certainly does not apply to a considerable number of patients. Thus both the faucial and nasal pseudo-membranes may be treated every second or third hour from the time of their formation with the best disinfectants which we possess, so as to destroy all the micrococci in them and render them an inert mass, and yet croup not infrequently occurs during the progress of the case. Again, in certain cases croup begins at the commencement of the diphtheritic attack. The laryngitis commences as early as the pharyngitis, and therefore does not result from it. Sometimes the inflammation of the air-passages is from the first the predominant lesion, the pharyngitis being subordinate or even trivial. Thus a boy of two years, ten months, whom I attended, died of croup lasting about four days. He lived in the suburbs of the city, where the houses were scattered, and where there had been no recent diphtheria. The attack began with hoarseness, which gradually increased to a fatal obstruction in the air-passages. Close and repeated inspection of the fauces revealed only redness and some swelling of the parts that were visible, and the symptoms indicated but slight coryza. The diphtheritic nature of the disease was rendered certain by the occurrence of diphtheria in its usual form, in the two nurses immediately after the death of the child. In this case croup began at the beginning of the sickness, and it is evident from the history and the lesions that the contagium was not transferred to the larynx from any of the other surfaces. In view of the number of such cases I see no propriety in assigning to diphtheritic croup a mode of origin different from that of other diphtheritic inflammations. But the possibility, and perhaps, probability, in some instances of an auto-infection we will not deny.

Anatomical Characters.—It is important to acquaint ourselves with the anatomical characters of croup, especially with the nature of the pseudo-membrane, that we may know what measures to employ in order to remove it and prevent, as far as possible, the laryngeal stenosis from which so many perish. The surface of the larynx, trachea, and, in severe cases, that of the bronchial tubes, is hyperæmic and swollen, and

the inflammatory action involves more or less the submucous connective tissue, causing infiltration or œdema. The relation of the exudation to the mucous surface varies according to the kind of epithelium present. Where the epithelium is of the flat or squamous variety, the fibrinous exudation from the bloodvessels is poured out around the epithelial cells, which perish. If the inflammation extend more deeply, the underlying connective tissue is also embraced in the coagulation and perishes. Prof. Ziegler of Tübingen, who has made repeated microscopic examinations of the pseudo-membrane, says: "It sometimes happens that the dead epithelial cells become saturated with the exuded liquid and then pass into a peculiar condition of rigidity akin to coagulation. The seat of this change appears to the naked eye as a dull, raised, grayish patch surrounded by red and swollen mucous membrane. The exudation is rich in albumen and the transformed cells take on the appearance of a kind of coarse mesh-work, almost or altogether devoid of nuclei." This is superficial diphtheritis, and Prof. Ziegler next describes deep or parenchymatous diphtheritis as follows: "It is characterized by the coagulation, not merely of the epithelium, but also of the underlying connective tissue. The affected patch is swollen and assumes a whitish or grayish tint, the discoloration extending through the epithelium to the connective tissue structures. The epithelium in some cases is lost altogether, and then the diphtheritic patch consists of dead connective tissue only. . . . The dead tissue is separated from the living by a zone of cellular inflammation. Fibrinous filaments are seen here and there through the mass. The lymphatics in the neighborhood contain coagula and leucocytes."

Squamous epithelium covers the nostrils, buccal cavity, fauces, the larynx upon and above the superior vocal cord, with the exception of its anterior aspect. The pseudo-membrane therefore upon all these surfaces lined with this form of epithelium consists of the exudate from the blood which surrounds and permeates the epithelium, or epithelium and subjacent connective tissue. These two distinct elements, that poured out from the bloodvessels and the normal tissue of the mucous surface now dead, incorporated in one mass, therefore constitute the pseudo-membrane. Its intimate relation with the surrounding living tissue is such that we cannot detach it without lacerating the latter and causing bleeding.

The anterior aspect of the larynx from the middle of the epiglottis downward, all that part of the larynx below the superior vocal cord, the entire trachea, and the bronchial tubes, are lined by columnar epithelium. Whenever this variety of epithelium is present, the exudate from the blood does not become incorporated with the mucous membrane, but escapes to the surface and coagulates in a layer over it. It is therefore loosely adherent to the underlying tissues, being attached to it by some fibrinous threads, and when it is peeled off, the hyperæmic and swollen

mucous membrane is seen underneath in its entirety, unless, as is commonly the case, a considerable part of its epithelium has been shed and been expectorated. The loose attachment of the pseudo-membrane in the trachea and bronchial tubes is of the greatest significance in its relation to tracheotomy.

I wish in this connection to call attention to the confusion which may occur in the use of the terms diphtheritic and croupous, as employed by pathologists on the one hand, and clinical observers or practitioners on the other. Pathologists, following Virchow, designate the inflammation diphtheritic when the epithelium and underlying tissues remaining *in situ* are blended with the exudate and become a part of the pseudo-membrane, whatever may be the cause of the inflammation, and they designate the inflammation croupous, whatever its cause, when the exudate escapes to the surface of the mucous membrane, as in the trachea and bronchial tubes, and coagulates upon it. Therefore, in all cases of pseudo-membranous inflammation of the air-passages, even that due to "taking cold," or to inhalation of an irritating vapor, they term the laryngitis diphtheritic, since in the larynx the exudate is incorporated with the mucous membrane, while the pseudo-membranous tracheitis or bronchitis in the same patient is termed croupous, since the exudate lies upon the surface. Practitioners, on the other hand, apply the term diphtheritic to all inflammations which occur as local manifestations of the specific disease, diphtheria, and only to such inflammations, whatever may be their form, whether pseudo-membranous or catarrhal.

The epithelial cells embraced in the pseudo-membrane undergo a histological change. We have stated Ziegler's remark that they are permeated by the exudate of the blood. Cornil and Ranvier say, "Wagner admits the fibrinous degeneration of the cells. . . We have verified the description given by Wagner, but we would conclude that the cells are filled with a material which approaches mucin rather than fibrin." In the first week, the pseudo-membrane forms more rapidly, and is usually thicker and more extended, producing dyspnoea more quickly than when it forms in the declining stage of the disease. If the membrane be detached by the forcible coughing of the patient, it is usually quickly reproduced unless the diphtheria be in its advanced stage and abating. If the croup continue from four to six days, the pseudo-membrane begins to soften from commencing decomposition and to disintegrate. The minute fibres which attach it to the membrane give way, and in favorable cases by the effort of coughing or vomiting it is thrown off. Separation is aided by the muco-pus which collects underneath.

Symptoms.—Whenever croup is one of the local manifestations of diphtheria, such general or constitutional symptoms are present as pertain to this blood disease, such as febrile movement, anorexia, thirst, and progressive loss of flesh and strength. The temperature in the commence-

ment in croup from this cause is usually higher than at an advanced period, unless some complication occur, as pneumonia, which increases the heat of the system. The temperature is not, however, in the beginning, ordinarily above 103° or 104° , and, as the croup continues, and the systemic blood-poisoning becomes more marked, the temperature usually falls, so that, even in the gravest cases, it is often at or below 100° . Most patients also have those inflammations which commonly attend diphtheria, *i. e.*, pharyngitis and more or less coryza, but they are relatively unimportant in comparison with the croup, for, unlike the croup, they do not in themselves involve immediate danger to life.

Croup commonly begins gradually and insidiously, revealed at first to the physician by hoarseness or huskiness of the voice, and a hoarse or harsh cough. Both voice and cough are feeble, lacking the fulness and sonorousness present in spasmodic laryngitis. In grave cases, approaching a fatal termination, the voice becomes more and more indistinct, and finally is suppressed. The cough, also, which in the beginning of the croup was strong and expulsive, becomes feeble and ineffectual, and less frequent as the fatal result draws near.

The amount of sputum varies considerably in different cases. If the inflammation extend no further downward than the trachea it is scanty, but if there be coexisting bronchitis, it is more abundant, consisting of muco-pus with occasional flakes of pseudo-membrane. By vomiting a larger quantity is expelled than by the cough. Occasionally masses of pseudo-membrane of considerable size are expectorated, even moulds of some part of the respiratory passage, always with great temporary relief to the patient. A pseudo-membrane of considerable thickness and extent obstructs the expectoration of muco-pus, which, collecting in the lower part of the trachea and in the bronchial tubes, greatly increases the dyspnoea. The respiration is somewhat more frequent than in health, but it is not notably increased except when bronchitis or broncho-pneumonia is present. At an advanced stage, when stupor supervenes from non-oxygenation of the blood, the respiration may be slower than in health.

Croup in its commencement and in the active period of diphtheria without treatment almost never remains stationary or abates. Little by little or often quite rapidly, the laryngeal stenosis increases, and soon the patient begins to experience the want of air. He becomes restless, has an anxious expression of the face, seeks change of position, reaching out his arms to the nurse or mother to obtain relief. In some patients only a few hours elapse and in others a day or more of gradual increase in the obstruction, when it becomes evident that death must soon occur unless relief be afforded. In this stage the post-clavicular, infra-clavicular, supra-sternal, and infra-mammary regions are depressed during inspiration, and the larynx is drawn with each inspiratory act towards the sternum. While there is constant suffering, there are also occasionally

most distressing attacks of dyspnœa attended by an increase in the lividity of the features and extremities which now have an habitual dusky pallor. Sometimes these attacks are perhaps due to the doubling of a detached end of the pseudo-membrane on itself, or perhaps to a movement of the muco-pus by which bronchial tubes are occluded. With the ear applied over the larynx or upper part of the sternum, a loud rhonchus is heard both on inspiration and expiration, produced by the passage of the air over the obstruction, and obscuring to a great extent the other sounds. Moist bronchial rales are also common.

Those who recover from membranous croup without tracheotomy, and by the use of inhalations, and thus far they constitute only a small minority, usually improve gradually, the obstruction diminishing by softening and detaching of portions of the pseudo-membrane, the cough becoming looser and the voice less hoarse. After the detachment of the pseudo-membrane, several days elapse before the thickening and infiltration of the mucous membrane disappear and the epithelial cells are restored.

Diagnosis.—Catarrhal laryngitis with a usual amount of thickening and infiltration of the mucous membrane and the underlying connective tissue, so as to produce stenosis and obstruct respiration, may be mistaken for pseudo-membranous inflammation. In the N. Y. Foundling Asylum, two children have at different times died with the symptoms of membranous laryngitis, and the obstruction was found to be due entirely to the thickening and infiltration of the mucous and submucous tissues of the larynx by newly-formed corpuscular elements. Of course, death from catarrhal laryngitis is rare, but that this disease may produce such an amount of laryngeal stenosis as to cause even fatal dyspnœa, like that from the presence of pseudo-membrane, these two cases show. In most instances, the diagnosis of membranous laryngitis from catarrhal laryngitis is easy, by the presence of patches of pseudo-membrane on the fauces, or by the history of the case, which evidently points to diphtheria as the cause. I have elsewhere alluded to a child in my practice who died with the symptoms of acute laryngeal stenosis, without any pseudo-membrane upon visible parts, and with only a moderate pharyngitis. This case, which might have passed as one of catarrhal laryngitis, accompanied by an unusual amount of cellular and serous infiltration, as there was no known diphtheria in the vicinity, was really due to diphtheria, and was a local manifestation of that disease, for immediately after the death of the patient the two nurses had unequivocal symptoms of diphtheria. The difficulty in using the laryngoscope in young children is such, when their fauces are swollen, that it has not heretofore aided much in the differential diagnosis of the various forms of acute laryngeal stenosis in young children, at least when employed by the general practitioner.

Prognosis.—The mortality from croup obviously depends to a great extent on the prevalence and the type of diphtheria. From what has been stated above, it follows that croup is more frequent and more fatal in a grave form of diphtheria than in mild epidemics with a less degree of blood-poisoning. In New York City, during the fifteen years ending with 1878, the percentage of recoveries was very small, both under medicinal treatment and tracheotomy. During this long period, surgeons, not saving more than three to five per cent. of their cases by tracheotomy, performed this operation reluctantly. But since 1878 the percentage of recoveries after tracheotomy has been much greater. The mortality from croup is greater the younger the patient; for the younger the child, the less the diameter of the air-passages, and the more quickly laryngeal stenosis results. The younger the child, also, the more difficult is the use of the proper remedies, and the less the time for their use before fatal dyspnoea occurs. We have already said that croup appearing in the declining stage of diphtheria is less severe and more easily controlled or cured than when it occurs in the commencement of diphtheria. Much depends, also, upon whether the physician is summoned at the very beginning of the croup, and appropriate remedies are early and persistently employed. In many instances the friends do not take alarm, and the physician is not summoned till the disease is well under headway, and there is not the requisite time for the action of inhalations. Obviously, also, croup, beyond all other diseases, requires faithful and intelligent nurses, for without the co-operation of such nurses night and day, in the care of the patient, the most judicious measures are often rendered inefficient.

Exact statistics are lacking to show what proportion of cases of croup recover by strictly medicinal treatment. If we regard as incipient croup those cases in which the voice becomes hoarse or harsh, but no dyspnoea occurs, and the lungs are fully and normally inflated, a considerable number, I think, more than fifty per cent. in my practice recover. There may be in these cases a catarrhal laryngitis, or there may be a thin film of pseudo-membrane upon the laryngeal surface, not sufficient to embarrass respiration. Slight laryngitis, therefore, occurring in the course of diphtheria, unaccompanied by any increase in temperature, or change in the freedom or rhythm of respiration, and whose only symptom is a huskiness of voice, if treated early and properly by inhalations, passes off in a few days in a large proportion of cases. It possesses little importance except that it might be the initial stage of croup if neglected. It is obviously improper to consider this trivial form of laryngitis as membranous croup, although by neglect it might become such. In the statistics of croup, those cases only should be included in which the symptoms are so pronounced that it is evident that more or less laryngeal stenosis is present, although there may as yet be no marked dyspnoea.

In determining the percentage of recoveries in croup, it is proper to arrange cases in two groups: 1st, cases which have received only medicinal treatment; 2d, cases in which tracheotomy has been performed. Having been in almost continuous practice, since diphtheria began in New York, in a section of the city where this disease has always been prevalent, and having witnessed all kinds of treatment—that by emetics, by depletion, by stimulation, by inhalation and insufflation—it is my opinion that not more than one in eight has recovered by medicinal treatment in this long period, of cases of croup, which began in the first week of diphtheria, and in which the symptoms were so pronounced as to indicate more or less laryngeal stenosis. The exudation in the first week of diphtheria, or in its active period, occurs so rapidly, and in such large quantity, that no one of the medicinal agents or modes of treatment, which physicians commonly prescribe, is sufficiently prompt in its action to prevent the formation of the pseudo-membrane to an extent that soon endangers life. I allude to what has hitherto been the result.

Perhaps we may yet discover a mode of treatment that more effectually controls the formation of pseudo-membrane.

Croup occurring in the second or third week of diphtheria, since it is attended by less abundant and less rapid exudation than when it occurs during the acute stage, can be more successfully treated under the persevering use of solvent inhalations, and, according to my observations, a larger proportion than one in eight, perhaps one in three, recovers by the early and continuous or almost continuous use of inhalations.

Still the mortality is so large, and the suffering so great in croup, at whatever stage of diphtheria it occurs, that we cannot rely on the slow action of medicines or inhalations, and surgical treatment is in most instances required to diminish the suffering, and afford the best chances for saving life. Tubing the larynx, to which we will allude hereafter, has been so seldom performed, and the statistics of it are so meagre, that we are unable to state what proportion of patients may be saved by it. I have twice observed in the New York Foundling Asylum prompt relief from tubage, when the dyspnoea was so great as to threaten immediate death. In one of the two patients the relief was temporary, and in the other permanent. If the obstruction was confined to the larynx or larynx and upper part of the trachea, tubage would, I think, come into general use as a substitute for tracheotomy, but, unfortunately, it fails to give relief and save life in those many cases in which the obstruction extends throughout the trachea and into the bronchi. The statistics of tracheotomy, on the other hand, are abundant, and we are enabled therefore to determine to what extent it can rescue the victims of this disease from impending death. *The American Journal of Obstetrics* for May, 1868, gives the results of tracheotomy performed by Drs. Jacobi, Krackowizer, and Voss as follows:—

	Cases.	Recoveries.	Deaths.	Per cent. of recoveries.
Jacobi, Kraekowizer, and Voss	166	39	127	—
J. H. Ripley, N. Y. Med. Record, 1880	56	16	—	—
Parisian Children's Hosp., 1851-1875 (Tenné)	4663	—	—	24
Bethanien in Berlin, 1861-1872 (Bartels)	330	103	—	31.2
Berliner Chirurg. Klinik, 1870-1876 (Krönlein)	504	147	—	29
St. Annenspital Wien (Monti)	210	—	—	33
Table of Monti from various sources	2608	—	—	25
Hofmohl's statistics	3760	—	—	27
Küster's statistics	1556	—	—	32
C. Hospital, Trousseau, Paris, during 1883 (per Dr. L. Enfance)	359	115	244	32
Clinic of the Zurich Kantonspitals, under Rose and F. Krönlein, 1868, Mar. 1882 (11 under 2 years, 1 of 8 months)	238	92	—	39
Deutsche Zeitschrift für Chirurg., 1882, Bd. xvii. (H. Lindner)	101	—	—	37 $\frac{2}{3}$
Statistik der Tracheotomie per Croup, Deutsche Chirurgen Lieferung, 37 Stuttgart, 1880, by Kühn	277	125	152	—
Hôpital des Enfants Malad., Paris, 1850-1857	389	86	—	22
Hôpital des Enfants Malad., Paris, 1860-1867	813	208	—	—
Trousseau, according to Kühn	466	126	—	25
Guersant (Séjillot), Med. Oper., ii. page 480	171	36	—	21
Barthel, Hospital St. Eugénie, 1855-1868	573	160	—	28
Cases in the Parisian Hospitals and in the Provinces, Fascher et Bricheteau	1011	—	—	25
Roser (Lissard), C. C., 1854-1861	42	19	—	45.4
	Operations.	Recoveries.		Per cent. of recoveries.
Uhde, Archiv f. Klin. Chir. 1869, 1820-1869	81	21		25
Max Muller (Langenb. Arch. f. Klin. Chir. vii.)	45	15		33
Bardenheuer (Cölnen Bürgerhospitals, 1875-1876)	129	46		35.6
Krankenhaus Bethanien, 1873, and following (H. Settegast)	375	119		31.75
Billroth, Chirurg. Klinik Wien., 1871-1876	18	1		—
Reisz, Bronchotomiens Indic., 1858	17	5		—
Wansher (Copenhagener Kommuni Hospitals, Sept. 1863, Dec. 1876)	400	170		42.5

The result of tracheotomy in infants is much less favorable than in older children. Dr. Gustav Chagin has published in the *Archiv für Kinderheilkunde*, Bd. iv., the statistics of cases in infancy. These cases, 977, occurred since 1874; and of this number, 832, or 85 per cent., died. In the Copenhagener Kommuni Hospital, in which, as stated above, there was the remarkably good general result of 170 recoveries in 400 tracheotomies, only 5 per cent. recovered of children under one year; of 76 operated on between the ages of one and two years, 22 recovered, or 29 per cent.; while of 296 operated on between the ages of two and ten years, 146 recovered, or 49.3 per cent. In the Krankenhaus Bethanien, the results of tracheotomy from the beginning of 1861 to the close of 1876, tabulated according to the age, were as follows (H. Settegast):—

Age.	Tracheotomies.	Recovered.	Per cent.
2 to 3 years	93	22	23.65
3 " 4 "	165	47	28.45
4 " 5 "	175	54	30.85
5 " 6 "	107	39	35.45
6 " 7 "	90	34	37.77
7 " 8 "	59	17	38.86
8 " 9 "	24	11	45.83
9 " 10 "	15	6	40.00

These statistics show that the older the patient upon whom tracheotomy is performed, other things being equal, the greater the percentage of recoveries. Prof. Abraham Jacobi has probably performed tracheotomy for croup in as many cases as any other physician or surgeon in this country, not fewer, he thinks, than 400 times. His opinion corresponds with the common belief that, during the last five years, the percentage of recoveries after tracheotomy, in New York City, has been much larger than previously, and the operation is performed more frequently by the attending physician than formerly. The result of tracheotomy during a long series of years, ending with 1878 or 1879, was so unfavorable, on account of the type of the disease, that Dr. Jacobi thinks, in the aggregate of his cases of tracheotomy since 1858, only about 12 per cent. recovered.

Although at present in this city the percentage of recoveries after tracheotomy is much larger than formerly, yet the statistics of some of the prominent physicians and surgeons show nearly as large a proportion of death as in former years, probably because the operation has been deferred till the patients were nearly moribund. Thus, one surgeon records only 4 recoveries in 21 operations during the last three or four years, and a physician of large experience, connected with one of the institutions where children are treated, has been equally unsuccessful in his tracheotomies, but he has operated only when the dyspnœa was extreme, and death momentarily expected. Earlier operation might have given better results.

The statistics of recent tracheotomies, which seem to me to indicate most accurately the results of this operation when skilfully performed, and not at too late a stage in the type of diphtheria now prevailing in this city, I have obtained from Drs. J. H. Ripley and Fred. Lange. The operations embraced in their statistics were performed since January 1, 1879, with the following result:—

Tracheotomies.	Died.	Recovered.	Per cent. of recoveries.
66	44	22	33 $\frac{1}{3}$

These surgeons do not select cases for the operation, but they operate on nearly every patient with croup, to whom they are summoned, provided that death seems inevitable without tracheotomy. They operate even if serious complications be present, as nephritis or pneumonia, or the blood be profoundly poisoned. With them the inducement to operate is suffi-

cient if tracheotomy diminish the suffering, or increase the chances of recovery in however trifling a degree. Inasmuch, therefore, as they do not select cases, so good a result is noteworthy.

Some physicians in this city make greater discrimination in cases, and do not operate if the condition of the patient be such that death will in all probability occur after tracheotomy. They do not, therefore, advise the operation, if the patient have profound blood-poisoning or severe local disease elsewhere than in the air-passages. Such physicians by the early performance of tracheotomy, and by careful attention to the after-treatment, making frequent visits and supervising the details of the management, furnish more favorable statistics of the operation than any of those published above. Thus, Dr. A. R. Robinson, who makes such discrimination in cases, who operates early, does not insert the canula until all loose muco-pus and shreds of pseudo-membrane are expelled by the cough from the trachea and bronchial tubes, and who supervises by frequent visits the after-management, has saved since 1880 eleven in thirteen consecutive cases of undoubted membranous croup. It is seen from the above statistics that we can claim for tracheotomy judiciously performed, and at a sufficiently early stage, the cure of one in every three patients in the average. The statistics in Boston show that the results obtained in that city in hospital practice have been about the same as those in New York and in European cities. In an interesting paper on tracheotomy in croup, published in the *Medical News*, July 12, 1884, the writer says: "Tracheotomy for this disease has been performed one hundred and eighteen times at the Boston City Hospital during the past twenty years. Thirty-nine, or one in three, were successful. That the cases were not selected is shown by the fact that three patients died during the operation from shock and exhaustion, not from hemorrhage; thirty-four died within twenty-four hours; and fifty-six, or more than one-half of the fatal cases, within forty-eight hours. Four, if not five, of the successful cases were practically moribund at the time of the operation. . . . The ages of these patients ranged from nine months to forty-one years. The youngest to recover was eleven months; the oldest sixteen years. Four aged two years and five aged three years got well. Membrane was visible in the fauces or trachea in a large proportion of both the successful and unsuccessful cases. Its absence was noted in only three of each class. It need not be said that in every instance there was present severe, constant, and increasing dyspnoea, exhausting the strength and threatening suffocation."

Preventive Treatment.—In attending a case of diphtheria the physician should notice at each visit whether the patient have any hoarseness or other signs indicating implication of the larynx, since, if the danger be recognized at its inception, it may perchance be averted. Inef-

fectual as inhalations may be for fully declared croup, we have seen in speaking of the prognosis that experience fully justifies the belief that they are sufficient in a large proportion of cases to relieve that degree of laryngitis which is indicated by simple hoarseness, and which if it continue might eventuate in serious obstructive disease. If the physician observe such symptoms, he should immediately recommend that the air in the apartment be kept moist by the croup kettle or pans of hot water over the fire, into each of which a lump of lime is placed. I frequently surround the bed with a tent made with a clothes-horse, over which blankets are thrown, and place the croup kettle underneath. Frequently stirring the water in the kettle adds to its efficiency. I prefer, however, in most instances, to employ the steam atomizer either with or without the croup kettle. It should be so constructed that it throws a heavy spray of rather turbid lime-water, and should be almost continuously used as long as the premonitory symptoms of croup continue. It obviates the necessity of heating the apartment, which in hot weather is very uncomfortable.

It is proper in this connection to consider which is the most efficient and the best agent for inhalation in croup. Have we an agent that can be safely used, which will prevent, when inhaled, the formation of the pseudo-membrane, or which will dissolve it when it has already formed? The agents which have been most employed for this purpose are lime-water, lactic acid, pepsin, and bromine.

In selecting the one that is safest and most efficient, the important fact should be borne in mind that anything which irritates, so as to increase the inflammation of the mucous surface, is injurious. Whatever intensifies the inflammation, evidently augments the thickening and infiltration of the mucous membrane, and increases the area as well as thickness of the pseudo-membrane. It is therefore harmful instead of beneficial. In my opinion the teachings of Bretonneau and Trousseau did immense harm in the fact that they brought into use agents far too irritating to the sensitive mucous surface. Since the pressing danger in croup arises from the obstruction produced by the pseudo-membrane, and by the thickening and infiltration of the mucous membrane underneath, that agent is indicated, if it can be found, which loosens and dissolves the pseudo-membrane, and at the same time tends to diminish or at least does not increase the inflammation of the underlying tissues by its irritating action. Alkalies exert a solvent action on fibrin and mucin, and as the pseudo-membrane consists of the exudate from the blood largely fibrinous, and of epithelium and connective tissue which have undergone degeneration into a substance resembling fibrin (Wagner) or perhaps mucin (Cornil and Ranvier), their employment seems to rest on a sound therapeutic basis. Lime-water slightly turbid, but not so turbid as to clog the point of the steam atomizer, and containing about one and a half per cent. of liquor potassæ, is

probably as efficient and useful a solvent as any of the alkaline mixtures. One and a half per cent. liquor potassæ becomes about one per cent. when mixed with steam from the boiler.

By the persistent and timely use of such inhalations as soon as hoarseness appears, croup can, in my own opinion, be often prevented. But we all know how often, notwithstanding our best endeavors, croup occurring in the first week of diphtheria grows hourly worse. In these acute and rapid cases inhalations of the best agents, which physicians have hitherto used, act too slowly to prevent the growth of the pseudo-membrane, and in a few hours it becomes painfully evident that something more must be done or the life of the child is lost. In those many cases in which diphtheria is ushered in with croupous symptoms, and in which, within a few hours, laryngeal stenosis begins to occur, the experienced physician sees at a glance, often at his first visit, that inhalations, however faithfully employed, will be inadequate, and that suffocation, the most painful of all modes of death, will be inevitable, unless other and energetic measures are used.

On the other hand, in the milder forms of croup, in which the exudation has but moderate thickness and forms slowly, inhalations are of the greatest service, and, aided by internal remedies, they not infrequently arrest the disease and save life. The following was such a case: M. J., a girl of two years and five months, took diphtheria on January 6, 1884. I first saw her on the 9th, when a considerable amount of pseudo-membrane covered the fauces. The temperature was but moderately elevated, and a slight discharge occurred from the nostrils. Under the usual treatment the pharyngitis abated, and she seemed to be convalescing until January 14th, when her respiration began to be noisy and embarrassed. On inspecting the fauces a pseudo-membrane was seen upon the aperture of the glottis, apparently dipping down into it. The steam atomizer was employed almost constantly, throwing a spray of lime-water with about one per cent. of liquor potassæ. Each inspiration was accompanied by marked depression of the post-clavicular, epigastric, and infra-mammary regions, and the respiration was noisy and embarrassed till the 17th, when it began to improve, and the patient was soon out of danger. It will be observed that the croup commenced in the second week or in the declining stage of diphtheria. Had it been earlier, when the inflammation was more active, and the exudation more rapid, in all probability the patient would have perished unless saved by tracheotomy. The slowness of the exudative process afforded time for the action of solvent inhalations. Nearly at the same time that this case occurred, a patient in my practice, who had recovered from croup by tracheotomy, was seized with dyspnoea a month after the operation, when the opening had healed, and a flapping sound could be distinctly heard, produced probably by a pseudo-membrane, which was partially detached. This obstruction, which for a time appa-

rently involved great danger from the dyspnoea which it caused, was removed by the third day under alkaline inhalations. In such cases, in which the inflammation is mild and the exudation at a stand-still, or slow, the benefit from inhalations is most apparent. I am confident that one good result from alkaline inhalations is not fully appreciated by the profession; I refer to the fact that they render the muco-pus, which collects in large quantity in the bronchial tubes, and is expectorated with difficulty, on account of its viscosity, and the obstacle above it, thinner and more easily expelled.

Now that diphtheria has become so prevalent in this country, and so many children perish of the croup which it produces, it is to be hoped that some more efficient, and at the same time unirritating substance may be discovered for inhalation than those at present in use.

Since my attention has been called to the fact, by Dr. Van Syckel, of New York, that trypsin, one of the digestive ferments secreted by the pancreas, is a rapid solvent of fibrine, he having observed its action in the laboratory of Prof. Kühne, of Heidelberg, I have employed this agent in the usual form of diphtheria in several instances with such result as to encourage the hope that the solvent which we have so long needed has been found. I have never seen pseudo-membranes disappear from the fauces more rapidly than in cases in which the following mixture was applied, every half hour, with a large camel's-hair pencil, whether the good effect was due to the trypsin contained in the extract, or to the alkali, or to the combination of the two:—

Extracti pancreatis (Fairchild's), ʒj;
Sodii bicarbonat. ʒiij. M.

Add one teaspoonful of this to six teaspoonfuls of water.

Thus recently, in a child of about five years, a thick pseudo-membrane over each tonsil had disappeared by the third day, without apparently any irritating effect from the application. Mr. Fairchild has recently prepared trypsin in a liquid form, in order that its efficacy can be more readily and conveniently tested as a solvent for the membranes in croup; and Dr. H. D. Chapin informs me that this liquid employed in spray quickly dissolved the pseudo-membrane *in situ* upon the larynx removed from an infant that perished from this disease. Additional clinical observations will soon determine the value of trypsin as a solvent, and whether, if it be a good solvent, it can be utilized as a spray. That it requires an alkaline medium for its activity renders it compatible with alkaline inhalations.

Internal Treatment—Calomel.—This was long regarded as the most important internal remedy for membranous croup, as well as for diphtheritic exudations elsewhere than in the larynx. In the belief that it had a tendency to prevent the formation of pseudo-membranes, and aided in detaching and removing those already formed, it was in common use until

about twenty-five years ago. It was sometimes prescribed for croup in large doses, but more frequently in doses of one-half, one, or one and a half grains, repeated every second or third hour, and often in combination with an opiate, as Dover's powder. However useful a remedy it may be when judiciously employed in croup, as well as in certain other diseases, it fell into disuse on account of its ill-advised employment in diseases which did not require it, its employment often to the extent of producing unpleasant and even dangerous symptoms. When diphtheria was established in this country, calomel was in a few years discarded by most physicians as a remedy for croup, on account of the growing belief that nearly all cases of this disease were local manifestations of diphtheria, and required less depressing and more sustaining measures than mercury. Moreover, it was easy to point out cases in the writings of such masters of the profession as Bretonneau and Trousseau, in which calomel was improperly employed, doing harm by causing not only severe salivation, but also gangrene. Nevertheless cases occurred in those days which seemed to show that this agent properly employed is a potent and useful remedy for croup. One in the Astor House of New York attracted much attention. A child of about two years, stopping at this hotel, had pseudo-membranous laryngitis, with constant and increasing dyspnoea. Prominent physicians summoned to him expressed the opinion that he could not live, when, through the advice of a physician from an inland city who was temporarily sojourning in the hotel, twenty grains of calomel were placed on his tongue. From this time the dyspnoea began to abate, and the patient recovered.

The medical journals from time to time contain reports of cases of croup in which calomel has apparently been beneficial. In the *Med. Record*, July 12, 1884, Dr. J. P. Klingensmith, of Blairsville, Pennsylvania, states that physicians in his locality prescribe calomel in large doses for croup, and with greater success than that achieved by other modes of treatment, and he relates three cases, showing the result in his own practice:—

CASE.—A child aged 28 months took twenty grains of calomel placed on the tongue in the commencement of croup, and afterwards ten grains every hour till the third day when 720 grains had been taken. It was now discontinued, and on the sixth day the pseudo-membrane had disappeared. Recovery was rapid, and without any untoward symptoms.

CASE.—The second patient, aged three and a half years, had been sick forty-eight hours, with a temperature of 102° F. He had a croupy cough, and a pseudo-membranous exudation. Twenty grains of calomel were administered and afterwards ten grains every hour for fifteen hours, so that one hundred and seventy grains were administered. The child, which had previously been restless, fell into a quiet natural sleep. The calomel was discontinued, and a mixture of potassium chlorate and ammonium chloride given in its place. On the fifth day convalescence was fully established, without any unfavorable symptoms.

CASE.—The third patient, a girl of four years, had been sick twenty-four hours, with "high temperature, painful croupy cough, labored respiration, dry skin, flushed face, and some diphtheritic" exudation. Twenty grains of calomel

were administered and followed by hourly ten grain doses, till twelve doses were given. No other remedy was employed, and in three or four days the patient recovered.

These appear to have been genuine cases, and that they recovered tends to confirm the belief that calomel does exert a beneficial action on pseudo-membranous inflammations, either diminishing the exudation, or promoting the liquefaction and detachment of the pseudo-membrane.

A mode of treatment commonly accepted and practised by the profession through a long series of years usually does some good, in at least a certain proportion of cases, even if it be abused, else it would not have been likely to gain general acceptance. We know how quickly calomel cures the mucous patches of syphilis, even when they are of large size. These are produced by inflammatory changes in the tegumentary system, and they consist largely of epithelial or epidermic cells. They, therefore, contain elements similar to the pseudo-membrane in croup, but without the fibrin. We know also how readily fibrinous opacities on the cornea yield to calomel dusted on them. We may admit that calomel probably exerts a salutary action either on the exudative process or the pseudo-membrane, without being able to state precisely how it acts. Bouchut says of calomel in his article on croup: "This medicine promotes the expectoration and the rejection of the false membrane." Trousseau believed that the beneficial effects of the mercurial preparations were due mainly to their local action. He states that "wherever they can be applied locally" they "modify most powerfully the diphtheritic inflammation." He dusted the inflamed surface, if accessible, with calomel, or with a powder of the red precipitate, one part to twelve of pulverized sugar. The use of the mercurial collar for the neck in the treatment of croup, employed and recommended by Bretonneau, is familiar to those who have read his memoirs. Professor Jacobi also, who has probably given more attention to diphtheria than any other physician in America, apparently believes that mercury used locally is beneficial in croup, for he has recently recommended inunction with the oleate of mercury upon the neck, whenever the bichloride of mercury administered internally disagrees. It has seemed to me that one or two large doses of calomel administered in the commencement of croup, when there is no decided cachexia, do exert a beneficial action on the course of the disease, as in the following:—

CASE.—R. male, aged three years, began to be croupy, but without any marked impairment of the voice, on November 7, 1884. The mother states that he has had sore throat nearly one week, but without medical attendance. He began to be croupy on November 7th, and his respiration gradually became more noisy and difficult till the evening of the 8th, when I was asked to see him.

His temperature was 99°. The dyspnoea was such that the post-clavicular, supra-sternal, and infra-mammary regions were depressed on inspiration, and his breathing was noisy, but the voice had nearly the usual clearness. The fauces, though red, were not notably swollen, and a

pseudo-membranous patch of the size of the nail of the little finger lay over the right tonsil. The diagnosis was, therefore made of mild diphtheria, but with dangerous laryngeal stenosis, probably from the presence of a pseudo-membrane; general condition of the child good. Six grains of calomel were placed on the tongue, and inhalation was ordered by the steam atomizer of the following :—

Liquor potassæ, ʒj;
Aquæ calcis, Oj.

The record of November 10 states : Resp. 38 per minute, still noisy, but no increase of dyspnœa; pulse 126; temperature in groin $99\frac{1}{4}^{\circ}$; slight discharge from nostrils; uses the inhalation almost constantly. From this date the pseudo-membrane and redness of the fauces gradually disappeared, and two days later the patient was out of danger.

The results of the treatment of diphtheria and of the inflammations which accompany this disease are liable to produce an erroneous opinion in regard to the value of therapeutic agents, since cases differ so greatly in type or severity. But the experience of many physicians justifies the belief that mercury and especially calomel employed within certain limits in the commencement of a pseudo-membranous inflammation does exert some controlling action on this disease. That it did much harm formerly when physicians prescribed it as freely as we now employ potassium chlorate to the extent in many instances of increasing the cachexia, and causing mercurialism, should not deter from its judicious use. In the ordinary form of diphtheria I would not advise the use of calomel, or would limit its employment to one or two doses of six to ten grains in the commencement of the disease in robust cases. But in croup, since the danger is not from the cachexia or blood-poisoning so much as from the laryngeal stenosis, which is apt to develop rapidly, that medicine is indicated, and should be prescribed, which most strongly retards the exudative process, and aids in liquefying and removing the pseudo-membrane; provided that it produce no deleterious effect which renders its use inadmissible. Hence it is proper to prescribe calomel in larger doses and for a longer time in the treatment of croup, than in other forms of membranous inflammation, if it fulfil the indication as it seems to in a measure. In my own practice, however, calomel is not prescribed after the first or second day, since I prefer the use of other remedial measures, which are efficient, and are less likely to produce injurious effects.

Emetics.—These have been largely used in all forms of croup, and in catarrhal or spasmodic croup they usually produce marked relief. Formerly emetics were much employed in the treatment of membranous croup, but now that diphtheria has spread throughout the country, and most cases of this form of croup occur in patients suffering from diphtheritic blood-poisoning, depressing emetics as ipecacuanha and antimony have fallen into disuse since they were found to be badly tolerated. In my practice a child of ten years with severe diphtheria and with commencing

croupy symptoms, sank rapidly and died between two of my visits, from exhaustion produced by a single large dose of ipecacuanha administered by anxious parents without my advice.

But an emetic gives partial relief to the dyspnœa in certain cases, since it assists in expelling the muco-pus, which blocks up the tubes below the pseudo-membranes, and sometimes portions of pseudo-membrane which are easily detached. If an emetic be employed one should be selected which acts promptly with little depression, and as a rule it should, I think, only be used at the commencement of croup. If after the initial period there be that degree of dyspnœa which suggests its use, tracheotomy is preferable as more likely to give relief, and save the patient. Of the emetics which are admissible in the commencement of croup, sulphate of copper is one of the best. Several years since in one case, in which there were at my first visit dyspnœa, croupy cough, and a pseudo-membrane over each tonsil, and in which I had made an unfavorable prognosis, the parents, observing the good effects of two grains of sulphate of copper, repeated the dose every two to four hours till the following day, and the patient recovered. Such a result however I regard as exceptional. Probably in ordinary cases the best emetic is the yellow sulphate of mercury or turpeth mineral in a powder of two or three grains. The use of this emetic in croup was prominently brought to the notice of the profession by Prof. Fordyce Barker, who administered this agent immediately after being summoned to a case, and he alleges with remarkable benefit to his patients. It has, however, been recently stated on apparently good authority that turpeth mineral when it enters the stomach, although it causes vomiting, is not itself ejected unless in small quantity, so that a considerable share of its action may be through its absorption and like that of calomel.

Internal Disinfectants or Germicides.—The theory which happens to prevail regarding the nature of a disease necessarily influences the treatment. It is now commonly believed that diphtheria is produced by bacteria, and therefore the use of agents which are destructive to micro-organisms is at once suggested as the proper treatment for diphtheria, and for the inflammations which the specific principle of diphtheria gives rise to. Hence sulphite of sodium, sulpho-carbolate of sodium, the phenic acid of Déclat, and chlorine preparations have been administered internally in the treatment of diphtheria, but whether they produce a better result than iron and potassium chlorate is doubtful.

But attention is now widely drawn to the bichloride of mercury, which by common consent is more destructive to micro-organisms, when employed locally, than any other agent that can be safely used. Physicians in search for a remedy that would destroy micrococci in the system and thus remove the cause of diphtheria were naturally led to make trial of this agent in the hope that an antidote or specific had been found. If the bichloride can be safely administered in doses sufficiently large there is

every reason to suppose that it will destroy microbes in the interior of the body, as well as upon its surface. If clinical experience show that it can be used in such doses without poisonous effect, it deserves recognition as the specific for diphtheria. If, without injury to the patient, it act promptly enough to kill the microbe before serious organic changes have occurred in the organs, as granulo-fatty degeneration of the muscular fibres of the heart, or nephritis, it would save many lives and become as important a remedy for diphtheria as quinine is for diseases produced by malarial miasm. But unfortunately we have to deal with an agent long recognized as a deadly poison, and it is a problem yet to be solved whether it would not destroy the patient if employed in doses sufficient to destroy the micrococci. A strong argument in favor of this use of the bichloride was presented to the profession by Dr. Thallon, of Brooklyn, in two papers published in the *N. Y. Jour. of Medicine*, in April, 1884. His argument was substantially as follows:—

It has been shown that the bichloride of mercury destroys the bacteria in a liquid having 20,000 times its weight. Now, if 20,000 grains of blood are disinfected by one grain of the bichloride, 7000 or one pound are disinfected by one-third of a grain. Prof. Flint, Jr., states that, although the proportionate quantity of blood in the system varies in different individuals, it may be assumed that on the average it is in the proportion of one to eight of the entire weight of the body. Therefore one grain of the bichloride would destroy the microbes, and disinfect the blood, in a child weighing twenty-four pounds, two grains in one weighing forty-eight pounds. But if the bichloride can be safely administered to a child in such doses that its system contains one or two grains, still it must be remembered that in diphtheritic systemic poisoning micrococci occur in the lymphatics and the tissues, and therefore a considerably larger quantity of the bichloride is necessary to produce complete disinfection than the quantity which is required to disinfect the blood.

But whether the bichloride, administered internally, is a safe, efficient, and proper remedy for diphtheria must be determined by experience. If it be shown to be such by clinical observations, it should of course be administered in all cases, whatever be the seat of the inflammation. It should be administered in the croup of diphtheria, for if we remove the cause the inflammations will abate or can be more successfully treated.

A considerable number of observations have been made in the last year showing that adults badly tolerate large doses of the bichloride. Thus one-twentieth of a grain administered hourly to an adult with phthisis till seven or eight doses were given each day produced bloody diarrhoea at the close of the third day, when about one grain had been taken. The same result followed in another adult when one-twentieth of a grain had been administered every second hour in the day time only, for four days. In a third patient one-twentieth of a grain given hourly in the day time for five days

caused profuse salivation and pain in the gums like that from calomel. A fourth adult patient took one-thirty-second of a grain hourly for eleven hours and then one-twenty-sixth of a grain for seven hours, when griping pain in the abdomen occurred, and liquid stools. (Dr. A. H. Smith.) One adult case only is related in the experiments of Dr. Smith, in which no ill effects followed the administration of one-twentieth of a grain doses of the bichloride though administered hourly in the daytime for eight days. Cases might be mentioned in the practice of other physicians, showing that the bichloride is a dangerous remedy if given in germicide doses in the treatment of adults. In one instance in my practice bloody diarrhoea occurred on the fourth day from the uterine douche used three or four times daily, and fatal cases have been announced in the journals from the douche.

But children seem to tolerate the bichloride better than adults, as they do arsenic. It has been largely used during the last year in New York as a remedy for diphtheria, and especially for diphtheritic croup, and physicians of experience state that more patients have recovered from croup under treatment by the bichloride than from any other medication which they had previously employed. (Jacobi.) The following brief statement of the effects of the bichloride treatment in diphtheria and croup in a few cases in the practice of Drs. Thallon, Armor, Skene, Jacobi, and myself will aid to an understanding of the therapeutic value of this agent in pseudo-membranous inflammations.

CASES.—A child of $6\frac{1}{2}$ years, having diphtheria after scarlet fever, took gr. $\frac{1}{25}$ hourly, most of the time for one week, and subsequently the same dose hourly in the daytime, and two or three times at night, with no unfavorable symptoms; but the urine was increased to 70 ounces. A child of 4 years, having croup, complicating diphtheria, and with urgent symptoms, took gr. $\frac{1}{40}$ of the bichloride every hour and a half to three hours. In five and a half days she took more than two grains, and in one day more than half a grain. Portions of the pseudo-membrane were expectorated, and the patient recovered. There were no unfavorable symptoms from the bichloride.

Of five children who recovered from the ordinary form of diphtheria reported by different observers, one, aged 9 years, took gr. $\frac{1}{40}$ every one and a half hours, and in one day nearly half a grain, till the fifth day, when a little over two grains had been taken. The second child, also aged 9 years, took nearly one-half grain of the bichloride in the first twenty-four hours, and in two days three-quarters of a grain. The third patient, aged $4\frac{1}{2}$ years, took gr. $\frac{1}{40}$ of the bichloride every two hours on the first day, and afterwards at longer intervals. In the fourth case, a child of $7\frac{1}{2}$ years, gr. $\frac{1}{40}$ was given every two hours, for how long is not stated, but the membrane became less on the second day. The fifth patient, aged 2 years 5 months, had a hoarse whispering voice and noisy (guttural) respiration; temperature 105° . The pseudo-membrane appeared over the tonsil in considerable quantity at the close of the second

day. The bichloride, gr. $\frac{1}{4}$, was given every second hour alternately with six minims of the tincture of the chloride of iron. Alkaline inhalations were constantly used, and one teaspoonful of brandy given every two hours. The bichloride was administered three days with no appreciable ill effect, and with gradual improvement of the patient.

Although during the last few months the bichloride has been largely used as a remedy for diphtheria and pseudo-membranous croup, in doses like those employed in the above cases, but few instances have been published in which it seemed to disagree. It has, however, in some patients caused diarrhœa, and apparently colicky pains, as in adults, so that it was deemed advisable to discontinue its further use. According to my observation it does not save life, or materially mitigate the intensity of the disease, or the inflammation, if profound blood-poisoning, or grave complications, as nephritis, have occurred when its employment is commenced.

The following cases, among others which have come under my observation, show that the bichloride if administered in grave cases at a late stage is powerless to save life: A child of $3\frac{1}{2}$ years, with malignant diphtheria, took at first the ordinary remedies, such as iron and potash, and when the urine had become heavily albuminous, and the fauces much swollen and covered with a dense and foul pseudo-membrane, the bichloride was prescribed in hourly doses of gr. $\frac{1}{4}$. Two days later death occurred, apparently from the blood-poisoning. Another patient of the same age, and nearly the same history, lived four days under the bichloride treatment. Perhaps better results might have occurred from its earlier use.

Clinical observations will soon determine the actual value of the bichloride in the treatment of diphtheria and diphtheritic inflammations; and if it be a safe and useful remedy, whether its beneficial effects are due to its germicide action, or to the same therapeutic effects as those obtained from other mercurial agents. It may be conveniently prescribed in the following formulæ recommended by Pepper and Thallon:—

R.—Hydrarg. bichlor., gr. ss.

Tinc. ferri chloridi, f ʒij.

Glycerinæ, f ʒss.

Aquæ, q. s. ad f ʒij.—Misce.

One teaspoonful every hour to two hours.

R.—Hydrarg. bichlor., gr. ss.

Elix. bismuthi,

Vini pepsini, āā ʒiss.—Misce.

One teaspoonful every hour to two hours.

It does not seem necessary or prudent in ordinary cases to continue the use of the bichloride more than three or four days in large and frequent doses.

Since membranous croup in localities where diphtheria prevails is in most instances a local manifestation of this disease, the same sustaining general treatment is required which is proper in ordinary cases of diphtheria.

The tincture of the chloride of iron, administered every second hour in liberal doses, potassium chlorate, quinine, brandy or other form of alcohol in large and frequent doses, long used in diphtheria as tonics and blood restorers are indicated. Medicines of this kind may be given between those which are designed to correct the exudative process, and aid in removing the laryngeal obstruction, and which have been described above. The diet should be nutritious and easily digested, consisting largely of milk and the meat teas. For those with poor appetite and feeble digestion, peptonized milk, and the peptonized meat juices may often be advantageously prescribed.

Surgical Treatment.—Although the best possible treatment by inhalations and internal medication be early employed and without intermission, yet it is the common experience in all countries that such treatment is in a large proportion of cases inadequate, and that many perish from suffocation unless relieved by surgical interference. We have stated above, that if croup occur at the commencement of diphtheria when the exudative process is active, and the pseudo-membranes form rapidly and abundantly, death is the common result, if medicinal treatment only be employed. But if the inflammation be less intense or subacute, as in the second week of diphtheria, so that there is more time for the action of medicines and inhalations, and if, as is sometimes the case, the stenosis appear to be at a stand-still, without any marked suffering from want of air, resort to surgical measures may be judiciously postponed.

The indications for surgical interference are a gradual increase of the stenosis and consequent dyspnoea, notwithstanding the constant and judicious use of remedial agents, and a manifest suffering from want of air as shown by restlessness of the child, and the expression of suffering in his features, with or without lividity of the surface. We, adults, may have some faint conception of the suffering, which children with acute laryngeal stenosis undergo, when we have severe nasal catarrh and attempt to breathe with the mouth closed, and the paramount duty of the physician to relieve suffering should prompt to a resort to other measures when medicines prove inadequate, even if we leave out of account the important object of saving life. When therefore membranous croup is found to be progressive after having been observed and properly treated from six to twenty-four hours, and the child begins to suffer from want of air, the propriety of surgical interference should be considered.

Tubage.—In 1858, Bouchut published a paper in the *Moniteur des Hôpit.* on a new method of treating croup by tubage of the larynx. He employed a straight cylindrical tube nearly an inch long. The tube was introduced by means of a male catheter open at its two ends. Tubage excited some attention and discussion at the time in the Parisian capital, and M. Gros related a case of its successful employment. It was found in experiments on animals that the tube caused ulcerations, and as it did not produce the uniform relief which follows tracheotomy, and was dis-

countenanced by Trousseau, Barthez, and others, it fell into disuse, and was abandoned as a substitute for tracheotomy even by those who at first warmly advocated it. Recently Dr. O. Dwyer, of the New York Foundling Asylum, has devised a tube of about the same length, but differing from that of Bouchut, from having a greater antero-posterior than lateral diameter, and therefore conforming to the shape of the laryngeal aperture. The left index finger, guarded by a broad metallic ring, is carried far back in the mouth of the patient so as to depress the root of the tongue and raise and fix the epiglottis, and the tube is introduced by a curved handle, attached to its inner surface; the handle is detached by a spring. The tube can be readily removed by attaching the handle to the same fastening on its inner surface. Tubing as thus employed usually relieves laryngeal stenosis, and I am not aware that the instrument of Dr. O. Dwyer, although employed in a considerable number of instances, has produced ulceration or other injury of the larynx.

CASE.—On May 21, 1884, during my term of service in the New York Foundling Asylum, Florence ———, $3\frac{1}{2}$ years, was admitted at the time of my visit, suffering from extreme dyspnoea. The symptoms of acute laryngeal stenosis were so pronounced, such as great depression at the summit and base of the chest on inspiration, restlessness, and the appearance of anguish in the features from want of air, that the child apparently could not live more than two or three hours without relief. The fauces were somewhat hyperæmic, but without pseudo-membrane. The tube was applied by Dr. O. Dwyer, with immediate relief of the dyspnoea, and the expectation of a large quantity of muco-pus. Liquid food was readily swallowed when the tube was present, but occasionally some of it entered the air-passages, provoking a cough. Three hours after the insertion of the tube the axillary temperature was 102° . 22d. Breathing still easy; axillary temp. 103° ; pulse, 130. 23d. The tube has given complete relief; a small pseudo-membrane exists on each side between the uvula and tonsils. 28th. The tube was expectorated to-day, and as the respiration remained normal without the tube, it was not replaced. 30th. Temp. $99\frac{1}{2}^{\circ}$; pulse 136, at times as low as 80; has a loose cough. When the tube was worn and immediately afterwards she expressed her wants in a feeble whisper, which could be understood even when the vocal cords were covered by the tube. The voice gradually returned after the expulsion of the tube, and no further treatment was required. The suffering of the patient was quickly relieved, and her life apparently saved by tubage.

The tube when *in situ* does not produce a cough, or apparently any unpleasant sensation in the larynx. Tubage would in my opinion come into general use as a substitute for tracheotomy, were it not for the fact that the pseudo-membrane in so large a proportion of cases extends beyond the larynx, and the tube fails to relieve tracheal and bronchial obstruction. Since tracheotomy gives equally prompt relief to the dyspnoea, and in a larger number of cases, and enables us to remove the obstruction from the trachea, and to a certain extent from the bronchial tubes through the artificial opening, the almost universal opinion in both continents that it is preferable to tubage or any other surgical measure,

has a valid foundation. Usually it is best not to defer tracheotomy, in order to make the uncertain trial of tubage, when the symptoms are so urgent that surgical measures are required.

Tracheotomy.—Since diphtheria has spread so widely, tracheotomy has become one of the most important operations in surgery. Properly performed, and at the proper time with judicious after-treatment, it rescues many children from a most painful death. The details of this operation are given in surgical treatises, but some general remarks relating to it will not be inappropriate in this paper.

Sanné says that the operator should have three assistants, at least one of them a physician. One should administer chloroform, one use the sponge, and the third, a physician, should be ready to assist in handing instruments, ligating vessels, etc. The operation is simple and devoid of danger, or difficult and dangerous, according to circumstances. The younger the child, the greater the danger, other things being equal. The greatest difficulty and risk attend tracheotomy in fleshy infants with thick and short necks, and in patients who have extreme dyspnoea, and are nearly moribund, so that the operator is impelled to hurry on the operation through fear that death will occur before the trachea is opened. The operator should have time for slow and cautious dissection, that he may avoid wounding vessels and other important parts.

The patient to be operated on should be placed on his back on a table covered by a blanket, and a bottle or block about four inches in diameter should be placed under his neck, so that the head is thrown back at an angle of forty-five degrees, and the anterior surface of the neck rendered prominent. Chloroform is then administered. An incision should be made through the skin in the median line one and a half to two inches in length, according to the age, and extending to within half an inch of the sternum. Through the connective tissue to the trachea the dissection should be slowly and cautiously made with the point of the knife, the scissors, and the blunt hooks which are used to tear the connective tissue and draw aside vessels. The tip of the finger occasionally pressed upon the trachea aids in determining its location, and serves to guide the dissection which should always be in the median line. Little cutting is required after the skin has been divided, but when fibres of connective tissue resist the blunt hooks, they should be cut either by the point of the knife or the scissors. A grooved director is also useful in the dissection, since by it the operator is enabled to raise and tear resisting fibres, or detach them from parts underneath, so that they can be more readily divided.

Some surgeons prefer the high, others the low operation. In the high operation the trachea is found nearer the surface, and the vessels in the way are less numerous than in the low operation. In the operation, however, the trachea is usually opened at that point, whether high or low, which is most readily reached and laid bare. When this tube is exposed

a longitudinal incision is made through its anterior wall sufficiently long to allow the canula to be inserted. It facilitates opening the trachea if it be held by a tenaculum constructed for the purpose with the hook bent so as to be at right angles with the handle. The length of the incision through the trachea should be about five-eighths of an inch. The canula should not be immediately introduced, but the patient should be made to cough by inserting a pigeon's quill down the trachea into the bronchial tubes. Blood, muco-pus, and shreds of fibrin, if any be present, are expelled through the opening by the cough which the quill produces. The canula is now introduced with or without the aid of the tracheal dilator. The one which is in common use is that devised by Trousseau, with some subsequent improvements. It consists of two concentric cylinders, the external fenestrated, and the disk or plate which supports the tubes is movable upon them.

The result depends to a great extent on the subsequent treatment. The common result is immediate relief to the dyspnoea, but unfortunately in a large proportion of cases the temperature rises about the third day after the operation, and pseudo-membranes begin to form in the bronchial tubes, and in some instances broncho-pneumonia results. Surgeons have endeavored to prevent the formation of membranes in the bronchial tubes after tracheotomy by allowing lime-water to trickle through the aperture into the tubes; but now that probably a better solvent has been discovered in trypsin, a mixture of extractum pancreatis and sodium bicarbonate in water or trypsin in a liquid state as prepared by Fairchild, should be frequently sprayed into the bronchi by the atomizer when signs of bronchial participation in the disease begin to appear. No surgical operation more imperatively requires intelligent and attentive after-nursing than tracheotomy, since the canula needs to be often cleaned whenever obstructed by muco-pus. The febrile movement alluded to above as indicating the extension of the inflammation downwards in the tubes may be in a measure relieved by the application around the chest of one or two thicknesses of muslin wrung out of cool water and covered by oil silk. No certain time can be foretold for the removal of the canula if the patient live. If on withdrawing the inner tube and applying the finger over the end of the remaining canula, the patient breathe easily through fenestra, the laryngeal stenosis has probably so far abated that the tube can be safely removed.

The following is a description of the instruments in the tracheotomy case of one of the most skilful operators in New York City, Dr. Fred. Lange. All of them have small handles like those of dental instruments.

1. *a.* A scalpel, with cutting edge convex, the blade $1\frac{1}{2}$ inches in length, and its greatest width $\frac{1}{4}$ inch. This scalpel is employed in dividing the skin and in the subsequent dissection. *b.* A scalpel of same length, but with narrower blade and straight cutting edge, used for opening the trachea.

2. Two blunt hooks, with the hook straight, $\frac{1}{4}$ inch in length, extending at a right angle from the handle, having a diameter scarcely larger than a carpet needle. The end of the hook is slightly bulbous. A considerable part of the dissection is performed by the blunt hooks which are used in tearing the connective tissue.

3. Three artery clamps, by which bleeding vessels or oozing surfaces are seized, and the instruments with their points attached to the bleeding surface are dropped upon the sides of the neck. They thus aid in drawing open the wound.

4. Tenacula. Two with hooks in line with the handle; two others with hooks at right angle to the handle; the diameter of the curves in the hooks $\frac{1}{4}$ inch. Those with hooks at right angles are employed for transfixing and holding the trachea when it is to be opened.

5. Two grooved directors, one with the end smaller and more pointed than that of the other.

6. A common artery forceps, also forceps with fine teeth.

7. The spring hook of the oculist, employed by him in separating the eyelids; it holds apart the edges of the wound.

8. The tracheotomy tube consisting of two concentric cylinders, described above.

9. Pigeon's quills; these are important for removing muco-pus and fibrinous shreds from the trachea and bronchial tubes. An instance has come to my knowledge in which the physician who assumed charge of the case after the operation attempted to use for this purpose a small piece of sponge held by forceps; he unfortunately loosened his hold, the sponge was drawn in with the breath and immediate death by suffocation resulted. This would not have happened with the pigeon's quill.

Dr. Lange does not stitch the wound by the side of the canula, but leaving it open, dusts upon it iodoform, applies over the iodoform two thicknesses of linen soaked in a bichloride of mercury solution, one part to two thousand, and notched so as to surround and pass under the plate of the canula. The linen is covered by India-rubber gauze. Every hour the linen is moistened by the bichloride solution.

ARTICLE II.

A STATISTICAL REVIEW OF THE OPERATIVE MEASURES DEVISED FOR THE RELIEF OF PYLORIC STENOSIS. By RANDOLPH WINSLOW, M.A., M.D., Demonstrator of Anatomy in the University of Maryland, and Professor of Surgery in the Woman's Medical College of Baltimore; Surgeon to University and Bay View Hospitals, Baltimore.

BUT few of the ills to which humanity has fallen heir are attended with more distressing symptoms than those produced by stenosis of the pyloric

orifice, from any cause whatever, and in but few has the prognosis been so absolutely hopeless. Until within the past six years the condition was regarded as beyond the domain of surgical interference, and with the diagnosis, "stenosis of the pylorus," the fate of the patient was irrevocably sealed.

The *early history* of cancer and other affections of this portion of the alimentary tract presents so many features in common, that it is usually impossible to form a correct diagnosis until the narrowing of the lumen of the pylorus has progressed to a degree sufficient to interfere with the passage of the contents of the stomach into the duodenum, or until a perceptible tumor is discovered; even then many elements of uncertainty may be present.

The *cause* of pyloric obstruction in the vast majority of cases is carcinoma, but the cicatrization of gastric ulcers, and the thickening of the walls in consequence, are occasionally sufficient completely to close the orifice.

Symptoms.—In most cases of stenosis of the pylorus a tumor can be discerned in the epigastric or right hypochondriac region, even in those due to simple round ulcer, but sometimes the symptoms of coarctation are very decided, and no tumor can be felt. It may be situated under cover of the liver, and beyond external exploration. In other cases the tumor is displaced to the level of the umbilicus, or even as low as the pelvis, giving upon superficial examination the impression that the growth is in the great omentum or mesentery. The usual symptoms of pyloric obstruction are uncontrollable vomiting of the contents of the stomach, without bile, which are sour, offensive, and often contain a sediment resembling coffee-grounds. Gastric distress frequently amounting to severe pain is often experienced, or a sensation of dragging or tearing. The stools become more and more scant, and occur at long intervals. With these symptoms ectasis of the stomach will often be discovered upon careful percussion, or by means of inflating the viscus with Seidlitz powder, which is made to effervesce within its cavity, or the same can be seen by introducing a tube and filling the stomach with water.

Diagnosis.—When symptoms of indigestion have been long in existence, until finally the pain and vomiting have become habitual; when a tumor is detected in the pyloric region with which the stomach seems to be connected; and when this organ is found to be dilated by some of the methods mentioned above, the diagnosis is almost certain, but with these symptoms mistakes have been made. Billroth¹ upon one occasion made an incision for the purpose of performing pylorotomy, and found the trouble to be a wandering kidney, which he removed. Lauenstein,²

¹ Wien. Med. Wochenschrift, 1884, No. 27.

² Arkiv für Klin. Chirurg., Bd. xxviii.

on the contrary, performed laparotomy for the removal of a supposed floating kidney, and found he had to deal with a cicatricial contraction of the pylorus. Amongst other corroborative signs of carcinoma of the pylorus is the fact first observed by Van den Velden, and substantiated by Czerny,¹ that free hydrochloric acid is not found in the stomach when malignant disease of this opening is present. Mikulicz,² the inventor of the gastroscope, advocates the use of this instrument for diagnostic purposes. He says, when the pylorus is not stenosed, regular rhythmical motions can be seen to occur, but when it is the seat of cancer, these movements will be absent. Whilst ocular inspection of the stomach is certainly desirable, the gastroscope is too complicated and too expensive ever to be available for general use.

Prognosis.—Internal medicine offers absolutely no hope to the unfortunate sufferer from pyloric stenosis, and until recently he was doomed to die wretchedly from starvation. More than seventy years ago Dr. C. T. Merrem³ proved beyond question, by experiments upon dogs, that large portions of the stomachs of these animals could be excised without necessarily causing death, and in a published dissertation earnestly advocated the propriety of the operation upon man in appropriate cases. His suggestion met with no acceptance from his contemporaries, and he did not live long enough to see his views put to the test of practice. It remained for a future generation, guarded by the potent influences of antiseptic surgery, to accept his doctrines, and venture upon removal of portions of the human stomach. It must not be supposed, however, that gastrectomy has been undertaken in our day without careful experimentation upon animals and the cadaver, aided by observations upon man in analogous conditions of the intestines, and accurately recorded reports of post-mortem examinations of the conditions found in carcinoma of the pylorus.

Pylorectomy is a matter of gradual development, and certain preparatory stages were required before the operation was considered justifiable in man. First in importance in proving the feasibility of this operation has been experimentation upon animals, beginning with simple circular resection of the intestines, and ending with the almost complete removal of the stomach and the suturing of the cardiac and pyloric extremities together, which was successfully done by Kaiser and Werth⁴ upon a dog, the animal not only having been none the worse for this mutilation, but actually gained flesh, and was killed six years subsequently, a martyr to science.⁵ Circular resection of the human intestines for gangrene caused by hernia, as practised by Czerny and others, naturally attracted profound

¹ Wien. Med. Wochens., 1884, No. 17.

² Wien. Med. Wochens., 1883, p. 705.

³ Inaugural Dissertation. See Rydygier's Lecture, Volkmann's Sammlung, No. 220.

⁴ Rydygier's Lecture, Volkmann's Sammlung, 220.

⁵ See Archiv f. Klin. Chirurg., 1884, Band xxx. Heft 1.

attention, and the discovery of the important fact that peritoneal surfaces must be brought flatly together in order to obtain union, and the adaptation of the invaginating suture of Lembert or Gély, and the tier suture of Czerny have aided largely in rendering operative procedures upon the stomach possible.

Six operations have been practised for the relief of stenosis of the pylorus: 1st. Pylorectomy; 2d. Gastro-enterostomy; 3d. Gastrectomy; 4th. Gastrostomy; 5th. Duodenostomy; 6th. Digital divulsion of the pylorus.

PYLORECTOMY.—As previously stated, no operative treatment was ventured upon for the relief of pyloric disease until April 9, 1879, when Péan, of Paris, at the urgent request of the patient, who threatened to commit suicide unless relieved of his sufferings, performed laparotomy and removed a cancerous tumor of the pylorus, and by so doing ushered in a new era in abdominal surgery. His patient, a man, died on the fifth day of inanition. This operation attracted but little favorable notice, and was regarded more in the light of a surgical audacity than as an advance in the domain of legitimate surgery. His example was followed by Rydygier, of Kulm, on November 16, 1880, and his patient succumbed to collapse in twelve hours. On the 29th of January, 1881, Prof. Billroth, of Vienna, performed the third pylorectomy upon Frau Maria Theresia Heller, who was dying from starvation, the result of pyloric stenosis. The patient made a speedy recovery from the operation, gained flesh rapidly, and returned to her accustomed mode of life. She died from recurrence of the disease four months subsequently. The news of this operation spread with wonderful rapidity, and its successful issue was hailed as a great surgical triumph. The surgeons of Vienna especially greeted the great event with the liveliest expressions of joy and admiration. They called it an epoch-making operation.

Statistics.—Up to the present time pylorectomy has been performed over sixty times, in various quarters of the globe, and although this number is insufficient for determining the true value of the method, the indications for and against its performance, its technique, and its final results, still it is believed that valuable data may be gleaned from its statistics, meagre though they be. The following table¹ is believed to contain all the recorded pylorectomies which have been reported to date. In almost all of them the original publications have been examined, with the exception of those published in the Norwegian, Dutch, Polish, and Russian languages, in which cases abstracts in the German and American journals have been relied upon:—

¹ For previous statistics see Rydygier's Lecture, Volkmann's Sammlung, No. 220; Kahn's tables in Bulletin Gén. de Thérap., tome civ. p. 216; and Krönlein's tables in Correspondenzblatt für Schweizer Aerzte, July 15, 1882.

Statistical Summary of all Cases of Resection of the Pylorus recorded to February 1, 1885.

No.	Operator.	Residence.	Date.	Sex.	Age.	Disease.	Length of operation. Hours.	Result.	Cause of death.	Remarks.	Reference.
1	Péan	Paris	1879 April 9	M.	?	Carcinoma	2½	Death on 5th day	Inanition	.....	Wien. Med. Blätter, 1881, No. 7.
2	Rydygier	Kulm	1880 Nov. 16	M.	64	Carcinoma (scirrhus)	4	Death in 12 hours	Collapse	.....	Laucet, June 7, 1879. Deutsche Zeitschrift für Chirurgie, 1881, p. 253
3	Billroth	Vienna	1881 Jan. 29	F.	43	Carcinoma (colloid)	1½	Recovery	.....	Died in four months from recurrence.	Wien. Med. Presse, 1881, p. 205.
4	Billroth	Vienna	1881 Feb. 28	F.	39	Carcinoma (epithelial)	3	Death in 8 days	Inanition	A diverticulum formed at the greater curvature.	Wien. Med. Presse, 1881, p. 338.
5	Billroth	Vienna	1881 Mar. 12	F.	38	Carcinoma (medullary)	2½	Death in 12 hours	Collapse	Reported by Mikulicz.	Deutsche Med. Wochenschrift, 1881, p. 333.
6	Nicolaysen	Christiana	1881 Mar. 17	F.	37	Carcinoma (epithelial)	2½	Death in 15 hours	Collapse	Originally published in Nordisk Med. Ark., xlii. No. 27.	Trans. Internat. Med. Cong., 1881 (see article by Czerny).
7	Bardenheuer	Cologne	1881 Mar. 18	F.	54	Carcinoma (epithelial)	?	Death in 26 hours	Collapse	Much blood was found in stomach at autopsy.	Rydygier's Statistics in Volkmann's Sammlung, No. 220.
8	Woelfler	Vienna	1881 April 8	F.	52	Carcinoma (colloid)	?	Recovery	.....	Alive Jan. 1885, but has glandular enlargements in right groin.	Wien. Med. Wochens., 1882, p. 407; also in Woelfler's Book.
9	Berns	Utrecht	1881 April	F.	49	Carcinoma	Very tedious	Death in 4 hours	Collapse	Portion of pancreas ligated; vena cava exposed.	Wien. Med. Wochens., 1881, p. 1465.
10	Tillmans	Leipzig	1881 May 13	M.	63	Carcinoma	?	Death in 3 hours	Collapse	.....	Berlin. klin. Wochens., 1882, No. 34.
11	Jurje	Vienna	1881 end of May	F.	54	Carcinoma	?	Death in 24 hours	Collapse	.....	Wien. Med. Wochens., 1881, No. 23.
12	Krönlein	Zürich	1881 June 4	F.	54	Carcinoma	3	Death in 24 hours	Collapse	Many adhesions.	Corresp. blatt. für Schweiz Aerzte, 1882, p. 466.
13	Czerny	Heidelberg	1881 June 21	M.	28	Colloid	2½	Recovery	.....	Died Jan. 5, 1883.	Wien. Med. Wochens., 1884, No. 17.
14	Lücke	Strassburg	1881 June 25	M.	33	Scirrhus	5	Death in 10 hours	Collapse	Adherent to pancreas.	Deutsch. Zeitschrift f. Chirg., xvi. p. 260.
15	Kocher	Berne	1881 June 28	M.	42	Carcinoma	4	Death in 24 hours	Collapse	.....	Corresp. Blatt. f. Schw. Aerzte, Dec. 1, 1883.
16	Kitajewsky	Russia	1881 July 16	F.	52	Carcinoma	4	Death in 6 hours	Collapse	Originally published in Medicinsk Obzrenije.	Centralblatt für Chirg., 1881, p. 783.
17	Weinlechner	Vienna	1881 Aug. 18	M.	47	Carcinoma	5	Death in 6 hours	Collapse	Many adhesions to pancreas and liver.	Centralblatt für Chirg., 1882, p. 349.
18	Billroth	Vienna	1881 Oct. 33	F.	36	Carcinoma (glandular epithelial)	1½	Recovery	Died 10 mos. subsequently.	Some glands were enlarged and removed, but were not cancerous.	Wien. Med. Wochens., 1881, p. 1427; letter from Dr. Von Hacker, Feb. 1885.
19	Billroth	Vienna	1881 Nov. 5	M.	44	Carcinoma	?	Death on 3d day	Peritonitis	Many adhesions; pancreatic juice in belly.	Centralblatt für Chirurg., 1881, p. 349.
20	Rydygier	Kulm	1881 Nov. 20	F.	30	Stenosis from ulcer	?	Recovery	.....	Alive eight months subsequently and five months pregnant.	Berlin. klin. Wochens., 1882, p. 39.
21	Langenbeck	Berlin	1881	?	?	Carcinoma	?	Death soon after operation	Collapse	Adhesions to pancreas.	Deutsch. Wochens., 1882, p. 31.

Statistical Summary of all Cases of Resection of the Pylorus recorded to February 1, 1885.—Continued.

Operator.	Residence.	Date.	Age.	Sex.	Disease.	Length of operation. Hours.	Result.	Cause of death.	Remarks.	Reference.
22 Gussenbauer	Prague	1881 ?	?	F.	Carcinoma	2	Death in 16 hours	Collapse	.....	Reported to 11th Cong. of German Surgeons, Deut. Med. Wochens., 1882.
23 Laneustein	Hamburg	1882 Jan. 3	F.	34	Stenosis from ulcer	5	Death in 8 days	Gangrene of colon and peritonitis	Mesentery of the colon was extensively detached.	Archiv f. klin. Chirurg., Bd. xxviii. p. 427.
24 Molitor	Carlsruhe	1882 Jan. 12	F.	28	Carcinoma (scirrhus)	2½	Recovery	.....	Died eleven and a half months subsequently.	Archiv für klin. Chirurg., 1883, Bd. xxix. Heft 3.
25 Van Kleeff	Maestricht, Holland	1882 Jan. 27	F.	37	Stenosis from ulcer	2	Recovery	.....	.....	Deutsche Med. Wochens., 1882, p. 715.
26 Kocher	Berne	1882 Mar. 23	M.	35	Carcinoma	?	Death on next day	Collapse	.....	Corresp. blatt. für Schweiz Aertze, 1883, Dec. 1st.
27 Southam	Manchester, England	1882 April 5	M.	43	Carcinoma (scirrhus)	1½	Death in 14 hours	Collapse or acute septicæmia	.....	Brit. Med. Journal, April 15, 1882, p. 163.
28 Fort	Rio Janeiro	1882 April 17	F.	?	Carcinoma (scirrhus)	3	Death in a short time	Collapse	An exploratory incision had been previously made and closed.	Gazette des Hôpitaux, 1882, p. 979.
29 Hahn	Berlin	1882 May 20	F.	63	Carcinoma	?	Death on 8th day	Peritonitis	Rupture of sutures; no adhesions.	Berlin. klin. Wochens., 1882, p. 561.
30 Richter	San Francisco	1882 May 21	M.	51	Carcinoma	2½	Death in 3 hours	Collapse	.....	Western Lancet, San Francisco, 1882, p. 289.
31 Caselli	Genoa	1882 June 14	F.	?	Carcinoma	2	Death on same day	Collapse	.....	La Sainte Italia Medica, 1882, p. 169.
32 Billroth	Vienna	1882 Aug. 3	F.	?	Stenosis from swallowing caustic soda	?	Death on 6th day	Peritonitis	Sutures gave way.	Letter to Phil. Med. News, vol. xli. p. 319.
33 Maurer	Stuttgart (?)	1882 Sept. 4	F.	53	Carcinoma (colloid)	3	Death in 3 hours	Collapse	.....	Archiv für klin. Chirurg., Band xxx. Heft 1.
34 Jones	England	1882 Oct. 17	?	57	Carcinoma (colloid)	ong	Death in 6 hours	Collapse	.....	Lancet, 1882, vol. ii. p. 859.
35 Gussenbauer	Prague	1882 Oct. 20	F.	38	Carcinoma	3½	Death on 6th day	Purulent peritonitis	Two stitches ruptured.	Med. and Surg. Reporter. See letter by Lewis Schwartz, M.D., Dec. 30, 1882.
36 Bardenheuer	Cologne	1882	?	?	Carcinoma	?	Death in 8 days	Peritonitis	Adhesions to pancreas.	Centralblatt f. Chirurg., 1882, No. 46.
37 Bardenheuer	Cologne	1882	?	?	Carcinoma	?	Death on 2d day	?	Adhesions to pancreas.	Centralblatt f. Chirurg., 1882, No. 46.
38 Bigl	Perugia, Italy	1882 Nov. 11	F.	38	Carcinoma	2½	?	.....	.....	London Medical Record, Aug. 15, 1883.
39 Molitor	Carlsruhe	1883 Jan. 4	F.	44	Carcinoma (medullary)	4	Death on 3d day	Gangrene of colon and septic peritonitis.	.....	Archiv für klin. Chirurg., vol. xxix. Heft 3, 1883.
40 Czerny	Heidelberg	1883 Jan. 20	F.	39	Carcinoma (colloid)	2½	Recovery	.....	Adhesions to pancreas; Died April 24, 1884.	Wien. Med. Wochens., 1883, No. 17.

Operator.	Residence.	Date.	% Surv.	Disease.	Length of opera- tion. Hours.	Result.	Cause of death.	Remarks.	Reference.
41 Mikulicz	Cracow	1883 Feb. 22	..	Carcinoma (colloid)	2½	Recovery	.....	Alive when last heard from.	Wien. Med. Wochens., 1883, p. 705.
42 Billroth	Vienna	1883 June 24	F. 39	Carcinoma (scirrhus)	1½	Recovery	.....	Alive Jan. 1885; has recurrence.	Wien. Med. Wochens., 1883, p. 1213.
43 Socin	Basle	1883 summer	M. 38	Carcinoma	?	Death a few hrs	Collapse	Profuse hemorrhage; ligature of hepatic artery	Corresp. bl. für Schweizer Aerzte, Dec. 1st, 1883.
44 Socin	Basle	1883 July 15	F. 43	Carcinoma	2	Recovery	.....	Patient out in fourteen days; re- currence in less than a year; and a gastro-enterostomy per- formed.	Corresp. bl. für Schweizer Aerzte, Dec. 1st, 1883.
45 Supercio	Pontidera, Italy	1883 July 25	F. 43	Carcinoma	2½	Died on 3d day	Peritonitis	.....	Gaz. degl. Ospitali, Aug. 12, 1883.
46 Heinecke	Erlangen	1883 August	?	Carcinoma	?	Recovery	.....	.....	Centralblatt für Chirurgie, 1883, p. 352.
47 Kocher	Berne	1883 Sept. 21	F. 42	Carcinoma	?	Recovery	.....	Up in eighteen days; no adhe- sions.	Corresp. bl. für Schw. Aerzte, Dec. 1st, 1883.
48 Baileff	St. Peters- burg	1883	F. 38	Carcinoma	4½	Death on 7th day	Exhaustion & paralysis of stomach	.....	London Med. Record, 1884, July 15, from Vratsch, 1883, No. 8.
49 Reyher	St. Peters- burg	1883	F. 42	Carcinoma	4	Death in 4 hours	Collapse	.....	Ibid.
50 Zamboni	Conegliana, Italy	1883 Nov. 5	?	Carcinoma	2	Death on 7th day	Purulent peritonitis	.....	Gazetta degl. Ospitali, Dec. 12, 1883, and ibid. 1884.
51 Ruggi	Bologna	1883 Nov. 17	F. 40	Carcinoma	3	Death in 22 hours	Collapse (rapid ex- haustion)	.....	Gaz. degl. Ospitali, Dec. 23, 1883.
52 Czerny	Heidelberg	1884 Feb. 19	F. 40	Colloid	2½	Death on 4th day	Gangrene of colon	.....	Wien. Med. Wochens., 1884, No. 17.
53 Billroth	Vienna	1884 Feb. 26	F. 36	Scirrhus	1½	Recovery	.....	Was well without recurrence, in Jan. 1885.	Wien. Med. Wochens., 1884, p. 434, reported by von Hacker.
54 Czerny	Heidelberg	1884 Mar. 3	M. 56	Carcinoma	2½	Death on 7th day	Gangrene of colon	Adherent to pancreas.	Wien. Med. Wochens., 1884, No. 17.
55 Billroth	Vienna	1884 July	..	Carcinoma	....	Recovery	.....	Is still alive.	Letter from Dr. Victor Ritter von Hacker received Feb. 3, 1885.
56 Winslow	Baltimore	1884 Aug. 4	F. 42	Carcinoma	3	Death in 2 hours	Collapse	Tumor not adherent.	American Journ. of Med. Sciences, July, 1884.
57 Billroth	Vienna	1884 summer	..	Carcinoma	....	Death	.....	.....	Letter from Dr. von Hacker.
58 Weelder	Vienna	1884 summer	..	Carcinoma	....	Death	.....	.....	Ibid.
59 Billroth	Vienna	1884	..	Cleiatric stenosis	....	Recovery	.....	Radically cured.	Ibid.
60 McEwen	Glasgow	1884 October	..	Cleiatric stenosis	....	Death in a few hrs	Collapse	.....	Brit. Med. Journ., Nov. 1, 1884.
61 Spear.	Cumberland, Md.	1885 Jan. 10	M. 40	Cleiatric stenosis	1½	Death in 9½ hours	Collapse	Not adherent.	Letter from Dr. J. M. Spear; Am. Jr. Med. Sci., April, 1885, p. 369.

Norw.—Prof. v. Bergmann, of Berlin, recently excised the pylorus whilst removing an extensive cancerous growth. The man died.—*Journ. Am. Med. Ass.*, Feb. 14, 1885.
 Prof. Billroth, on Jan. 15, 1885, performed a modified pylorotomy upon a man suffering from scirrhus. Gastro-enterostomy was first performed in the usual manner, then the tumor excised, and the cut ends of the stomach and duodenum were entirely closed with sutures and not joined together. Operation lasted one hour and forty minutes, and patient was doing well when reported. Letter from G. W. Davis, M.D. (who was an eye-witness), in the *Boston Med. and Surg. Journal*, Feb. 19, 1885.

Retrospect.—In glancing over this table the first thing to attract attention will probably be the very great rapidity with which this operation became popular, and possibly the fact that the frequency of its performance has progressively declined during the past three years. If we tabulate the operation by years the following results are obtained: In 1879, Péan performed his solitary successful operation. In 1880, one case by Rydygier, also fatal. 1881, 20 cases were operated on by 16 surgeons, with 5 recoveries and 15 deaths; or, 25 per cent. successful, 75 per cent. fatal. In 1882 there were 16 operations by 15 surgeons, with 2 recoveries and 13 deaths, one case result unknown to me; or, $13\frac{1}{3}$ per cent. successful, $83\frac{2}{3}$ per cent. fatal. In 1883, 13 operations were performed by 12 surgeons; 6 recoveries and 7 deaths; successful, 46.15 per cent.; fatal, 53.85 per cent. In 1884, 9 operations are all that I can find notice of, performed by 5 surgeons, with 6 deaths and 3 recoveries; successful, $33\frac{1}{3}$ per cent.; fatal, $66\frac{2}{3}$ per cent. In January, 1885, one fatal case. Total operations, 61; recoveries, 16, or $26\frac{2}{3}$ per cent.; deaths, 44, or $73\frac{1}{3}$ per cent.; result in one case unknown to me.

Most of these operations have been performed in Austria and Germany, but isolated cases have been operated on in various portions of the globe. In Austria 18 operations have been performed, with 8 recoveries, or 44.44 per cent., and 10 deaths, or 55.56 per cent. Of these cases Billroth has performed 11, with 6 recoveries, $54\frac{1}{2}$ per cent., and 5 deaths, $45\frac{1}{2}$ per cent. In Germany 18 patients have undergone pylorotomy, with 6 recoveries, $33\frac{1}{3}$ per cent., and 12 deaths, $66\frac{2}{3}$ per cent. Of German surgeons, Czerny has performed the most operations, 4, with 50 per cent. recoveries. In Holland, 2 cases; 1 recovery and 1 death; each 50 per cent. In Great Britain, 3 cases, all fatal. In France, 1 fatal case. In Switzerland, there have been 6 operations, with 2 recoveries, $33\frac{1}{3}$ per cent. In Italy, 5 cases, with 4 deaths; 1, result unknown. In Russia, 3 cases, all fatal. In the United States of America, also 3 cases, which were fatal. Norway and Brazil are each credited with 1 unsuccessful case. From the above classification it is seen that pylorotomy in the hands of the Austrian surgeons has been followed by $44\frac{1}{2}$ per cent. of successes, whilst in Germany the percentage of recoveries is $33\frac{1}{3}$ per cent. Switzerland has the same average, but with only one-third of same number of operations, whilst Holland has the highest average, 50 per cent., but with only 2 cases. The United States of America, Great Britain and Russia, France, Brazil, and Norway, present a unanimous average of 100 per cent. of deaths. One is forced to recognize the fact that it is in the hands of Billroth and his special pupils, Czerny, Mikulicz, and Woelfler, that the best results have been obtained. This is a coincidence which is probably more than accidental, and bespeaks the skill of the great Vienna surgeon, both as an operator and as the teacher of skilful operators.

Sex.—Of the 61 patients operated on, 33 were women and 14 men, the sex of 14 being unknown to me. Why there should be such a disproportion between males and females I am unable to say, but it is probably accidental, as in 1303 cases of cancer of the stomach, tabulated by Wilson Fox,¹ 680 were males, and 623 females.

The ages of the patients varied from 25 to 64 years. Those in whom recovery took place were respectively 25, 28, 28, 30, 36, 37, 39, 39, 39, 42, 43, 43, 52 years of age. Age seems to have considerable influence upon the mortality of the operation, young persons not succumbing to the great depression as readily as those who are older.

Duration of Operation.—The length of time required for the performance of the operation varied from $1\frac{1}{4}$ to 5 hours. As might be expected, the long duration of the anaesthesia, and the cooling of the system which must occur in all very protracted operations, both, act as powerfully depressing agents, and the mortality is materially influenced thereby. No patient recovered where three hours were consumed in the operation.

The amount of tissue removed varied greatly, in some cases nearly 5 inches was excised from the greater curvature and in several of these recovery occurred. In two of Billroth's successful cases 5 inches (14 cm.) were removed from the greater curvature, but he finished the operation in $1\frac{1}{4}$ and $1\frac{1}{2}$ hours respectively, the shortest time on record, and the success probably depends more upon the celerity of the operation, than upon the amount of the gastric wall which is excised. In point of quickness the master Billroth bears the palm, as well as in general excellence of results.

Prognosis.—Whilst the result of the operation depends much upon the age and strength of the patient, the length of time required for operation, and the skill of the operator, it depends more upon the presence or absence of adhesions between the stomach and the neighboring viscera; and the determination of this point is impossible until the abdomen has been opened, and not always then. It is impossible to determine an absence of adhesions from the mobility of the tumor, for in several cases even after the abdomen had been opened, the presence of adhesions was not made manifest until the operation had progressed to such a point that it was utterly impossible to discontinue it. This was so notably in the cases of Langenbeck, of Lücke, and Jurié.² Adhesions to the pancreas are especially dangerous, and, if extensive, absolutely contraindicate the resection, chiefly on account of the great difficulty in arresting hemorrhage, but also from the fact that pancreatic tissue readily sloughs, and may allow the secretion of the gland to escape into the abdominal cavity. In Rydygier's case of excision for ulcer there were strong adhesions to the pancreas, which necessitated the excision of a considerable portion of its tissue, as

¹ Reynolds's System of Med., Am. ed., vol. III. p. 106.

² Bulletin Gén. de Thérap., vol. civ. p. 216.

happened also in one of Billroth's cases. Both of these cases were successful. With few exceptions, those patients in whom there were adhesions to the pancreas died. In the case operated on by Berns the vena cava was exposed for a distance of three inches and a portion of the pancreas excised, and in the case of Lücke there were many adhesions, and the portal vein was laid bare for some distance. Extensive adhesions to the transverse colon also expose the patient to great danger, on account of the liability to the occurrence of gangrene, an event which caused the death of Lauenstein's and Molitor's patients, and both of Czerny's. The latter surgeon¹ says we must be alive to this danger, and when it is necessary to detach the mesentery of the colon, a corresponding portion of the gut must be excised. Diffuse carcinomatous infiltration equally renders the operation unjustifiable.

Indications for the Operation.—What are the indications for which excision of the pylorus has been performed? 1st. Carcinoma, which, either on account of unendurable pain and distress, or by the production of stenosis and vomiting, threatened death from starvation. 2d. Ulcer of the stomach, which, in its cicatrization, produced a sufficient coarctation to close the pylorus. 3d. Stenosis, from swallowing a caustic liquid.

The vast majority of these operations have been performed on account of cancerous disease; 55 for this cause, 5 for idiopathic ulcer, and 1 for stenosis due to swallowing caustic soda with suicidal intent. In those reports, where the form of malignant disease is distinctly noted, it is seen that the mortality is very much less in colloid than in the other varieties of cancer. Thus, of 7 cases noted, 5 recovered, 3 of which died from recurrence at periods varying from 4 to 18 months. Woelfler's case remained healthy one year, when the disease recurred in the cicatrix, which was removed, and she again left hospital; she re-entered the wards in the summer of 1883, and is still alive, nearly four years from the time of the primary operation, but with recurrent growths in the groin. Adhesions to the pancreas and other neighboring organs are found in a large majority of cases, and enlargement of the adjacent lymphatics is almost always present. I have not noted the exact proportion of cases in which adhesions and glandular involvement were present, and as the references are not accessible at the time of writing, I will borrow from the editorial in *The Medical News*, November 24, 1883, formed from a study of 31 cases, in 8 of which neither adhesions nor glandular infection were noted, the mortality being 50 per cent., whilst in 23 these features were present, with only about 20 per cent. of recoveries.

When we consider the great gravity of this operation, the huge percentage of deaths, the impossibility of telling in advance whether adhesions are present or not, the great difficulty in removing the entire dis-

¹ Wien. Med. Wochenschrift, 1884, Nos. 17, 18, 19.

ease, and the certainty of the recurrence of the trouble either *in situ* or by metastasis, it is to the mind of the writer becoming more and more apparent that resection of the cancerous pylorus ought not to be performed, except under very exceptional circumstances. The number of months of life secured to the few does not compensate for the dreadful mortality of the operation. Quite otherwise is it with stenosis due to ulcer or to any non-malignant cause, not only is the mortality 25 per cent. less, but in the cases in which recovery has taken place, health has been fully restored. The case of Rydygier was presented to the Eleventh Congress of German Surgeons eight months after the resection had been performed, and not only was the patient in robust health, but had improved the time to the extent of being five months advanced in pregnancy. It is possible that better results might be obtained in cancer of the pylorus, if the operation was not performed as a dernier resort, but few surgeons, however, would be willing to submit patients to such a dangerous procedure as long as life was tolerably endurable, and but few patients would be willing to submit to operation until every other hope had proved delusive.

Two other indications are given by Rydygier¹ and von Hacker² for excision of the pylorus: uncontrollable hemorrhage from ulcer and perforation. In regard to the first of these, severe hemorrhage can scarcely ever come into consideration as an indication for this operation, as it is generally impossible to tell in advance what is the cause of the bleeding, whether from ulcer, cancer, simple inflammation, or hepatic disease. It might, however, justify in a very few cases an exploratory incision in order to determine the cause, and possibly the vessel might be secured, or the hemorrhage controlled by cautery or otherwise. I do not see how the presence of hemorrhage could of itself be an indication for excision. In regard to the perforation from ulcer, it would be the plain duty of the surgeon to perform laparotomy, if the condition were recognized, or even suspected; the probabilities would, however, be immensely in favor of a fatal termination from peritonitis, and it appears to the writer that such an individual would scarcely be placed in a more favorable condition by an excision of the pylorus. It would be better, when possible, simply to excise the ulcer itself, or to invert the torn edges and unite them with sutures.

Causes of Death after Pylorectomy.—Collapse is assigned as the cause of death in 27 cases, in 2 of which it was doubtful to the reporter whether death was to be attributed to simple collapse or to acute septicæmia. Of those dying in collapse, the periods at which death occurred are from "a short time after the operation" to 26 hours. 3 died of inanition and exhaustion on the 5th, 7th, and 8th days respectively. Peritonitis caused death in 10 cases, in 4 of which gangrene of the colon was present,

¹ Centralblatt f. Chirurg., Nov. 18, 1882.

² Wien. Med. Wochenschrift, 1884, p. 888.

due to extensive detachment of the transverse mesocolon and consequent interference with its blood supply. In 3 other cases in which peritonitis occurred some of the stitches were found to have become detached, and the contents of the stomach had escaped into the peritoneal cavity. In two of the cases in which gangrene of the colon occurred, there were also thoracic complications of septic origin; in one pyopneumo-thorax, in the other pleurisy.

From these items we learn that almost 50 per cent. of all those subjected to resection of the pylorus have succumbed in less than 26 hours from collapse; the patients not having had sufficient vitality to react from the prolonged and depressing operation. $16\frac{1}{2}$ per cent. of all cases died from peritonitis, from one or another cause; in several having been caused by the premature loosening of the sutures. This is a recognized danger which should be guarded against by a careful revision of the lines of union. Gangrene of the colon has proven an unexpected and very urgent danger, and it should be guarded against by detaching the mesocolon as little as possible, and when extensive detachment is necessary, by resection of the corresponding portion of the colon.

Technique of the Operation.—It would occupy too much time and space to enter minutely into a discussion of the technique of pylorectomy; besides it would be only repeating that which is already well known to most surgeons. Those who are interested in learning more in detail the various steps of the operation, I would refer to the translation of Dr. Woelfler's pamphlet, "Über die von Herrn Professor Billroth Ausgeführten Resectionen des carcinomatösen Pylorus," appended to Billroth's Clinical Surgery, published by the New Sydenham Society in 1881; to Wiener Medizinische Presse, 1881, vol. xxii. p. 770; or to Rydygier's excellent lecture in Volkmann's Sammlung Klinischer Vorträge, No. 220. I will content myself with presenting here only a brief outline of the operative acts.

Preliminary Preparation.—Several days previous to, and again shortly before the operation, the stomach ought to be thoroughly evacuated and its cavity well irrigated with some antiseptic solution; salicylic acid 1-1000, being that which is used by many surgeons. This can be effected readily by an ordinary stomach tube or piece of large drainage tube, into the end of which a funnel is inserted; the patient being in a sitting posture. Water is allowed to flow into the stomach until it is filled, then by depressing the end of the tube, or by causing the patient to assume the prone position, the current will be reversed and the viscus emptied. In this, as in abdominal operations in general, the observance of those important surgical principles of cleanliness and antiseptis is of the utmost importance.

The operation itself is divided into five stages:—

1st Stage. The abdominal incision.—It is a matter upon which there is considerable difference of opinion as to the best position for the

abdominal incision. Billroth prefers a transverse or an oblique incision over the most prominent portion of the tumor, which in his opinion affords better access to the seat of disease, but Czerny, who is the next most experienced and skilled operator, and Rydygier, as well as several other surgeons, made their incisions in the middle line, and found it to answer every purpose. There are, perhaps, but few cases in which an incision in the linea alba will not give sufficient space, and when such is the case, it would not complicate the operation much to make an additional transverse cut. It is certainly more difficult to maintain accurate apposition of the incision when the muscles have been divided transversely; and in one case peritonitis began at the transverse incision. Having opened the abdomen the first duty of the surgeon is to see whether the tumor has contracted such adhesions as will prevent a total extirpation of the disease, or which will render the operation long and difficult. Equally important is it to ascertain whether the malignant disease is diffused or confined to the pylorus and adjacent stomach wall. If the adhesions are great, or the disease disseminated, the operation must be discontinued and the abdomen closed; or if the stenosis is marked a gastro-enterostomy must be performed.

2d Stage. Isolation of the tumor.—The isolation of the pyloric tumor is effected by ligaturing the greater and lesser omenta in small portions with double ligatures, and cutting between the threads. The omenta must only be detached to a point corresponding to the line of the proposed excision, otherwise gangrene of the stomach or duodenum might occur. Warm carbolized or sublimated towels or pieces of gauze, or large flat sponges, are now pushed under the stomach, and the rest of the operation becomes extra-peritoneal to a large extent, any blood or intestinal contents being absorbed by the compresses.

3d Stage. Resection of the diseased portion.—The stomach is now secured by the hands of an assistant or clamped with forceps or rods covered with rubber, and it is divided from the smaller curvature obliquely downward from the left to the right. The difference between the lumina of the stomach and duodenum is to be overcome by bringing together the upper portion of the incision in the stomach, leaving an opening at the greater curvature of a size to correspond with the duodenum. In effecting this occlusion of the upper part of the incision, the mucous surfaces are first united with internal sutures, and then the serous surfaces are inverted by the Lembert suture, about one-third of an inch of the peritoneum being included in each suture, which is so passed as not to penetrate the mucous membrane, and finally a row of interrupted or continuous sutures, the whole forming the "tier" suture of Czerny. Péan and Rydygier employed catgut for suture, but strong silk rendered aseptic is more durable and equally as unirritating. Several modifications have been introduced by various surgeons, thus some prefer the hands of an

assistant to clamps for preventing the escape of the gastric and intestinal secretions, whilst others prefer mechanical occlusion as being more certain and less liable to accidents than that by the hand. After the division and occlusion of the stomach, the duodenum is divided and the diseased portion removed. Hemorrhage should be prevented by ligating the vessels as they are cut, hence it is recommended to divide the parts in successive cuts, stopping to seize the vessels. Kocher in addition recommends and practised successfully the crushing of a limited zone with forceps.

4th Stage. Reunion of stomach and duodenum.—As the result of experience all operators now prefer to insert the duodenum upon the greater curvature of the stomach. This is effected by a double or treble row of sutures; beginning from within, the posterior walls of the viscera are united by sutures which are entered and brought out between the mucous and muscular coats and in effect make a Lembert suture, only they are tied from within; the mucous surfaces are then sutured separately all around. The union of the anterior portion is effected by ordinary Lembert sutures, with an additional tier of interrupted or continuous stitches. After carefully inspecting all the sutures in order to be sure of their security, the parts are cleansed and disinfected and replaced.

5th Stage. Closure of abdominal incision.—This is effected in the usual manner; when the incision is transverse, it will be necessary to employ great care in carefully approximating the edges and in supporting them by deep relaxation sutures. An antiseptic dressing completes the operation. After the operation nourishing enemata are to be administered regularly every three hours, and only cracked ice allowed by the mouth. By the next day small quantities of milk or fluid may be permitted, and if the case progresses favorably solid food can be borne by the second week.

The operative technique is already nearly perfect, but it can rarely be completed under two hours, and usually the patient is in a condition of profound shock at its termination, from which he frequently fails to rally.

Results of Pylorotomy.—From a consideration of the statistics of pylorotomy for all causes, we learn that $26\frac{2}{3}$ per cent. of those operated on have survived the operation, and $73\frac{1}{3}$ per cent. have succumbed to causes set in motion by the procedure, the vast majority perishing in collapse within twenty-four hours.

Of the operations performed for carcinoma 24 per cent. recovered and 76 per cent. died. Of those who recovered, the first died 4 months subsequently from recurrence. The second, Woelfler's case, is still alive nearly four years subsequently, but has already submitted to one or more operations for the removal of recurrent growths of the abdominal wall, and has now an enlargement of the inguinal glands. She looks well, however. The 3d case died in 18 months; the 4th in 10 months; the 5th in $11\frac{1}{2}$ months; the 6th in 15 months; the 7th, Mikulicz's, is probably still alive; the 8th,

Billroth's, alive but with recurrence; the 9th, Socin's, after having made a wonderfully rapid recovery, went to work and supported her family, but the disease recurred, and 11 months subsequently gastro-enterostomy was successfully performed, and at last report, 4 months subsequently, she was again working for her living. Of the 10th case, Heineke's, I have no knowledge, nor of the 11th, Kocher's; both were performed late in 1883, and are probably alive. The 12th and 13th, performed about one year ago by Billroth, are alive and free from disease. The fact is indisputably proven that no case of cancer of the pylorus has been extirpated with the final result of a cure lasting over three years without recurrence. This fact, alone, however, ought not to deter one from the operation but for the very great mortality incident to it. 6 cases of non-carcinomatous stricture of the pylorus have been resected, with 50 per cent. of recoveries. In those who have recovered it is probable that the final results are perfect. Rydygier presented his patient to the 11th Congress of German Surgeons eight months later, and she was not only in robust health, but was advanced five months in pregnancy. Dr. Von Hacker writes me in regard to the case operated on by Billroth last year, that it is "radically cured."

GASTRO-ENTEROSTOMY.—This operation was first performed by Dr. Anton Woelfler, of Vienna, on September 27, 1881. It was devised upon the spur of the moment, as a substitute for pylorotomy in a case in which excision was rendered inadmissible, owing to extensive adhesions of the pylorus to the pancreas. As there was a high degree of stenosis present, and the man was dying from inanition, it was decided to attempt to afford an exit for the gastric contents by establishing a communication between the stomach and a neighboring loop of small intestine. The patient was thirty-eight years of age, and presented the usual symptoms of pyloric cancer. Upon the above date, Dr. Woelfler prepared to perform resection, but after opening the abdomen found the conditions too unfavorable, and rejecting duodenostomy, the only other alternative, he simply raised the nearest loop of small intestine, and after making an incision one and one-half inches in length in the free border of the gut and in the anterior stomach wall near the great curvature, united the edges of the two openings with Lembert sutures. The result was all that could have been expected, the patient, who had been vomiting incessantly for three months, ceased to regurgitate his food immediately, and in a few days well-formed stools were passed, and the bodily condition of the patient rapidly improved. He lived four months after the operation, a period of time exactly equal to that of Billroth's first resection. Gastro-enterostomy has been performed for all causes, thirteen times, as far as I can ascertain. It is easier to perform than pylorotomy, takes less time to accomplish, and exposes the patient to fewer risks. The following table contains all the operations recorded to date :—

Statistical Summary of all Cases of Gastro-enterostomy

No.	Operator.	Residence.	Date.	Sex.	Age.	Disease.	Duration of operation.
1	Woelfler	Vienna	1881 Sept. 27	M.	38	Carcinoma	?
2	Billroth	Vienna	1881 Oct. 2	M.	45	Carcinoma	1 hour
3	Lanenstein	Hamburg	1881 Dec. 15	M.	50	Carcinoma	2 hours
4	Rydygier	Kulm	1882 May	M.	54	Carcinoma	?
5	Lücke	Strassburg	1882 May	F.	?	Carcinoma	?
6	Kocher	Berne	1882 June 5	M.	50	Carcinoma	?
7	Lanenstein	Hamburg	1882	F.	25	Carcinoma	?
8	Courvoisier	Basle	1883 Oct. 19	F.	56	Carcinoma	2 hours 50 min.
9	Woelfler	Vienna	1883	?	?	Carcinoma	?
10	Rydygier	Kulm	1884 March 13	M.	20	Stenosis of duodenum from ulcer.	?
11	Monastyrski	Russia	1884	M.	36	Stenosis from swallow- ing sulphuric acid.	2 hours
12	Ransohoff	Cincinnati	1884 April 12	M.	34	Carcinoma	?
13	Socin	Basle	1884 June 5	F.	44	Recurrent carcinoma	1½ hours

From this table it will be seen that gastro-enterostomy was devised as a substitute for pyloric resection in those cases in which extensive diffusion of the disease rendered excision impracticable, and in which marked stenosis of the pylorus prevented the passage of the chyme into the duodenum. It is then an operation which does not aim at the production of a radical cure, but only of a temporary relief of the vomiting and distress due to obstruction. In but one case does it appear that this procedure was performed upon a patient on whom pylorotomy could have been easily accomplished. Our countryman, Dr. Ransohoff, performed gastro-enterostomy upon a patient upon whom pylorotomy could have been readily carried out, but as he was exceedingly debilitated it was judged best to establish a gastro-jejunal fistula, as being a less severe and shorter operation, and one which in the light of recorded pylorotomies offered at least as good a chance of prolonging life. The early death of his patient, of collapse, at least evinced the wisdom of declining the longer operation.

Dr. Rydygier performed gastro-enterostomy for other cause than extensive cancerous disease; his patient suffered from stenosis due to duodenal ulcer, and the channel for the food was diverted by uniting the stomach and jejunum.

Monastyrski also performed gastro-enterostomy for non-malignant stenosis. In the reported cases, thirteen in number, only four have recovered from the operation, but too unfavorable conclusions must not be drawn from this fact alone, as the condition of these patients was such as to have caused death in a short time without any operation. It seems to me that

recorded up to February 1, 1885.

No.	Result.	Cause of death.	Remarks.	Reference.
1	Recovery	.....	Cancerous adhesions prevented resection	Centralblatt für Chirg., 1881, No. 45.
2	Death on 10th day	Obstruction from bending of intestine. Exhaustion	Cancerous adhesions prevented resection	Ibid.
3	Death on 3d day		Disease too diffuse for resection.	Archiv für Klin. Chirg., Bd. xxviii. p. 420.
4	Death on 4th day	Hemorrhage from wound	Dis. too diffuse for resection; glands involved	Centralblatt für Chirg., 1883, p. 241.
5	Recovery	.....	.....	Deutsche Zeitsch. für Chirg., 1882, Bd. xvii. p. 573.
6	Death on 3d day	Bending of intestine	Cancer diffused; stenosis marked	Corresp. bl. für Schw. Aerzte, Dec. 1, 1883.
7	Death in 4 weeks	Marasmus	Metastatic disease of liver	Virchow, Archiv, 1884, Bd. 11. 2 abtheil.
8	Death in 12 days	Peritonitis and abscess	Cancer diffused	Corresp. bl. f. Schw. Aerzte, Dec. 1, 1883.
9	Death soon	?	.....	Med. Times and Gazette, London, Oct. 27, 1883.
10	Recovery	.....	Duodenum was strictur'd near pylorus, from ulcer	Centralblatt f. Chirg., 1884, Bellage to 23.
11	Death same day	Collapse	.....	Centralblatt f. Chirg., 1884, p. 332.
12	Death in 8 hours	Collapse	Pylorectomy could have performed but for asthenia	Med. News, Nov. 22, 1884, p. 578.
13	Recovery	.....	Pylorectomy had been successfully performed on July 15, 1883	Corresp. bl. f. Schw. Aerzte, Nov. 1, 1884, p. 513.

this method is especially applicable to ulcer of the stomach, and that its most valuable application might perhaps be found in this affection. Ulcus ventriculi is frequently situated at the pylorus, and is consequently irritated by the passage of food over its surface. It might gain more physiological rest if an opening were made elsewhere; at any rate, its cicatrization would not prevent the onward passage of the contents of the stomach.

The *technique of the operation* is sufficiently simple: a transverse incision over the stomach, the raising of the nearest piece of jejunum, and the attachment of its free border to the greater curvature of the stomach by means of interrupted sutures to the edges of the incision, and Lembert sutures to the peritoneal and muscular coats. The intestine must be clamped above and below the point at which the incision is to be made. The opening between the stomach and intestine ought to be one to one-and-one-half inches in length.

Comparisons.—Let us examine a little more closely the causes of death following this operation, and the periods at which the fatal event occurred, and in that manner we may be able to reach a more accurate comparison of the dangers and results incident to gastro-enterostomy and pylorectomy. Of 13 cases operated on, 9 have died at periods varying from 8 hours to 4 weeks; hence the proportion of recoveries is about $30\frac{3}{4}$ per cent. Of 11 cases operated on for carcinoma, 3 recovered, or $27\frac{1}{4}$ per cent. Of the first 13 cases of pylorectomy, 3 recovered, or 23 per cent. Of the first 11 cases operated on for carcinoma, 2 recovered, or $18\frac{1}{4}$ per cent.; hence it is seen that the advantage is in favor of gastro-enterostomy. It is scarcely

fair to compare the results of an operation which has been performed only 13 times, with the average results of one which has been performed five times as often, though even when the average of the whole number of pylorotomies is compared with that of gastro-enterostomy, it will not be to the disadvantage of the latter. It is a noticeable fact that only 3 have died from collapse; whilst in the first 13 pylorotomies 8 died within 26 hours from this cause. There seems, however, one danger inherent to this operation, which is the liability of the portion of intestine which has been attached to the stomach to form an angle, thereby interfering with the passage of the contents of the duodenum and stomach onwards. This occurred in Billroth's and Kocher's cases, and caused death in each, on the 10th day in one, and the 3d in the other. This accident can be prevented by uniting a greater extent of intestine to the stomach. The remaining deaths were from exhaustion, hemorrhage from the wound, and peritonitis, and in the second case of Lauenstein, which survived four weeks, and might properly be classed amongst the recoveries, from marasmus and metastatic disease of the liver. Courvoisier's case lived nearly two weeks, and died of peritonitis, due to an abscess, not having any connection with the seat of operation, which was found to be well healed.

Whilst the statistics of this operation at present only show 30 per cent. of recoveries, there is but little doubt that if it had been performed before the condition of the patients became so desperate, the successes would have been much more numerous. If, for example, in 1882, when 13 pylorotomies, with but two recoveries, were done, these patients had been submitted to gastro-enterostomy, it is entirely probable that the results would have been much better. Of the cases which recovered, 2 survived more than 4, and one more than 6 months, whilst the case of duodenal stricture was probably permanently relieved. Here the advantage is on the side of pylorotomy, for of the first 3 recoveries, one died in 4 months; the 2d, Woelfler's, is still alive, almost 4 years from the original operation, as I have just learned through the kindness of Dr. Ritter von Hacker, assistant on Prof. Billroth's clinic. The 3d recovery, that of Czerny, died in 18 months. The sum total of extension of life divided amongst the 3 gives each about $22\frac{2}{3}$ months. Of 10 recoveries after pylorotomy for carcinoma, the dates of whose deaths are known, or who are known to be still alive, an average of 16 months of life has been gained. Now whilst these results are good, and will doubtless increase in excellence as surgeons become more skilled in the performance of pylorotomy, it becomes a very serious question whether gastro-enterostomy by giving a shorter lease of life to more patients, is not, on the whole, to be preferred. If the patient is strong, and adhesions are absent, pylorotomy may be admissible, but if the patient is much run down, or there are adhesions to the pancreas, or glandular infiltration, there can be no doubt that gastro-enterostomy ought to be performed. Neither operation is radical, and

that which will bring temporary relief to the greatest number ought to be adopted. There is a class of patients whose lives are being slowly consumed with hunger and pain, upon whom it is proper to attempt, by operative means, to secure a measure of comfort during their remaining days or months of existence, and at last to obtain for them an euthanasic end. This I believe can be accomplished by gastro-enterostomy as far as it is possible for any operation to accomplish it.

GASTRECTOMY.—Amongst exceptional measures attempted for the relief of pyloric stenosis, due to extensive cancerous disease, may be mentioned, total extirpation of the stomach, by Connor, of Cincinnati. The operation was undertaken on December 7, 1883, at the urgent request of the patient, a woman, fifty years of age, and was not completed, the patient dying upon the table from shock. "He had hoped in his case to be able to get the cardiac end of the stomach attached to some portion of the intestinal tract, he did not care much where, so that the fluids poured out in the upper part of the small intestine might flow down to meet the food, and cause digestion in the part of the intestine where they come together. The operation he considered perfectly feasible, as far as the operative procedures are concerned."¹ A gastro-enterostomy would have given the patient a better chance for life.

GASTROSTOMY.—Gastrostomy² was performed by Hahn, of Berlin, in one case and a tube passed through the pylorus into the duodenum with the result of prolonging the life of the patient three weeks. I do not know the history of this case, but judge that if the disease were limited to the pylorus, and the patient had strength sufficient to survive gastrostomy, better success might have attended gastro-enterostomy.

DUODENOSTOMY.—Another operation which has been performed for the relief of pyloric stenosis is duodenostomy, or the establishment of a duodenal fistula through which the patient could be fed. As far as I have been able to ascertain, this has been done but three times, all of which terminated fatally, not so much however as the result of the operation, as from the fact that it had been delayed too long.

Statistical Summary of Cases of Duodenostomy.

No.	Operator.	Residence.	Date.	Sex.	Age.	Diagnosis.	Result.	Cause.	Reference.
1	Langenbuch	Berlin	1879 Sept 4	F.	32	Carcinoma	Death on 7th day	Inanition	Berl. Klin. Woch. 1881, p. 236.
2	Robertson	Oldham England	1883	?	?	Cleatrical stenosis	Death in 12 hours	?	Brit. Med. Journ. 1884, vol. 1. 1146.
3	Southam	Manchester, England	1884 Mr. 20	M	45	Fibrous stenosis	Death on 3d day	Inanition	ibid.

Rydygier reported three cases of duodenal fistula, all fatal, for what cause created, I do not know.

¹ Medical News, November 22, 1884, p. 578, also personal letter to me.

² Deutsche Med. Wochens., 1883, p. 319.

In two of these cases the stenosis was found to be cicatricial in character, the other carcinomatous. In the case of Langenbuch, of Berlin, which was performed on Sept. 4, 1879, an exploratory incision was made with the intention of resecting the pylorus, but the conditions were found to be too unfavorable, hence the first portion of the duodenum was united to the abdominal wound and a fistula created. The patient died of inanition. In Southam's case resection might have been easily performed, but for the great feebleness of the patient. His as well as Robertson's case were similar in character to those which have been so successfully treated by Loreta, of Bologna, by digital divulsion.

Notwithstanding the failure of these few operations to accomplish the purpose for which they were intended, they prove effectually the feasibility of the procedure. In experiments upon the cadaver, Southam found it extremely difficult to reach the first portion of the duodenum in order to attach it to the abdominal walls, but when the pylorus is the seat of disease, the stomach is usually dragged downwards and the duodenum is correspondingly displaced, and in none of these cases was any difficulty experienced in attaching the duodenum to the wound.

In the cases of Langenbuch and Southam, the operation was performed in two stages. 1st. The duodenum was attached to the wound by sutures extending through the entire abdominal parietes, and the serous and muscular tunics of the gut. 2d. After seven days in one case and three in the other the intestine was incised and nutritive instillations employed. The relief came too late, and both cases perished of inanition. No peritonitis or other unfavorable symptoms were encountered. Southam mentions inveterate ulcer of the stomach as another indication for the performance of duodenostomy, in order to give the organ physiological rest, and allow healing to occur. It seems to me that this would be a doubtful, very disagreeable, and withal dangerous remedy for simple ulcer of the stomach, and what is probably equally as good, and much safer, treatment by rectal alimentation ought to be conscientiously tried before resorting to any serious surgical procedure. If after faithfully trying rectal feeding it became necessary to undertake some operation, my preference would be for gastro-enterostomy.

One of the greatest disadvantages of gastrostomy is the irritation and excoriation of the neighboring integuments from the escape of the secretions of the stomach, equally as harassing would be the escape of the bile and other secretions from a duodenal fistula. In concluding this short review of this operation it strikes me that it is a procedure which is likely to have but few repetitions, as divulsion of the pylorus in non-malignant, and gastro-enterostomy in malignant stenosis will be sufficient for all cases which imperatively demand relief.

DIGITAL DIVULSION OF THE PYLORUS.—This operation was devised by Prof. Loreta, of Bologna, for the relief of non-carcinomatous stricture

of the pylorus, and was performed successfully for the first time on Sept. 14, 1882. The first suggestion in regard to dilating cicatricial strictures of the pylorus was made by Richter,¹ of Breslau, during the discussion on resection of the pylorus at the 11th Congress of the "Deutsche Gesellschaft für Chirurgie" held at Berlin on June 2d, 1881. He said: "But for non-carcinomatous strictures a less dangerous operation, the forming of a duodenal fistula, through which bougies can be used, appears better." This sentiment did not meet with much approbation from the surgeons present, and Billroth immediately expressed his opinion that "stenosis, the result of an ulcer, justified the operation of resection." Loreta appropriated Richter's suggestion, but modified it, so that as performed by himself the operation consisted of immediate and forcible divulsion of the contracted orifice by the finger, instead of the more tedious, and probably more dangerous instrumental dilatation. In one case a gastric fistula must be formed and maintained, whilst in the other the incision in the stomach is sewed up and the wound closed. Casati² says: "The merit of priority in the proposal of dilatation in pyloric stenosis belongs to Richter, but one must recognize in the divulsion of Loreta a substantial modification of the operative process." The Italians hailed this operation with the greatest enthusiasm. Casati declared it to be an operation which will make an era in the annals of the science and will place the name of Loreta amongst those of the greatest and most illustrious surgeons of the age.

As far as I can ascertain digital divulsion of the pylorus has been performed six times with the following results: recoveries 3, deaths 2, doing well when heard from 1.

Statistical Summary of Cases of Digital Divulsion of the Pylorus.

No.	Operator.	Residence.	Date.	Sex.	Age.	Symptoms.	Diagnosis.	Duration of oper.	Result.	Reference.
1	Loreta	Bologna	1882 Sept. 14	M	47	Suffering for 20 years; pain and bloody vomiting.	Stenosis from ulcer	33 mins.	Cure	Journ. Am. Med. Assoc., 1883, vol. i. p. 28.
2	Loreta	Bologna	1882 Dec. 22	M	18	Suffering for 7 years; pain, vomiting, and emaciation.	Stenosis from ulcer	50 mins.	Cure	Raccoglitore Medico, 1883, p. 147.
3	Giommi	Cesena	1883 Feb. 1	?	?	Patient in very bad condition.	Stenosis from ulcer	?	De'th in 12 hrs. coll'pse	Ibid.
4	Loreta	Bologna	1883 Mar. 17	M	46	Suffered 17 years with chronic gastritis, bloody vomiting, etc.	Stenosis from ulcer	28 mins	De'th in 36 hrs.	Ibid., 1883, p. 275.
5	Loreta	Bologna	1883 July 15	M	?	Suffered 3 years daily vomiting, gradually starving.	Stenosis from ulcer	20 mins.	Cure in 10 days	L'Indipendente, Aug. 15, 1883, p. 552.
6	Frattini	Venice	1884 June 9	?	?	?	Stenosis from ulcer	?	Doing well on 3d day	Gazetta degli Ospitali, June 15, 1884, p. 392.

¹ Deutsche Med. Wochens., 1882, p. 381.

² Raccoglitore Medico, 1882, p. 81.

This does not profess to be a complete record of all the digital divulsions of the pylorus which have been performed, but they are all that I have been able to collect from the literature at my disposal. I have strong reasons for believing that a number of other cases have been operated on.

As yet the operation of digital divulsion of the pylorus has not extended beyond the land of its birth, Italy, but it does not seem to have attracted that emulation which it deserves.

The *technique* of the operation is thus described by Dr. Hubert:¹ The incision of the abdominal walls over the pyloric extremity of the stomach on the right side, parallel with the costal arch for a distance of five or six inches. The stomach was thus brought into the wound and an opening made near the pylorus, the index finger was then introduced into its cavity and gradually insinuated into the pyloric orifice, the index of the other hand was then entered by the side of the first and they were forcibly separated until a dilatation of three inches had been accomplished, and the pylorus was felt to yield. The stomach wound was united by the Apolito-Gély suture, and the abdomen closed in the usual manner. The length of time consumed in the operations of Loreta varied from 20 to 50 minutes, the average of the four being $32\frac{3}{4}$ minutes. The patients did not suffer from profound shocks, and were able to take nourishment in a short while.

Symptoms, etc.—The perusal of the histories of the cases recorded is replete with interest and information. The patients had been suffering for periods varying from three to twenty years with digestive disturbances, pain and vomiting of blood, until they were reduced to the very verge of starvation. The diagnosis in all the cases was cicatricial stenosis from ulcer. It is somewhat remarkable that so many cases of simple stenosis of the pylorus should have come under the notice of one man in such a short time, and, as stated by Dr. R. P. Harris in *The Medical News* (April 21, 1883), is probably due to the generally defective nourishment of the poorer classes of Italians.

Results.—The result of these cases is very gratifying; of six cases operated on three were entirely relieved of all distressing symptoms, and were able to eat and digest ordinary food almost at once. The first patient upon whom Loreta operated gained forty-six pounds in one month; and that the results gained are fairly lasting is authenticated by Dr. Guido Pedrazzoli² of the Bologna Hospital, who, writing concerning the first two cases nearly a year subsequently, says: "The cases of recovery are perfect. Two cases have proved fatal, that of Dr. Giommi from collapse in twelve hours, the patient having been in a wretched condition previously. Loreta's 3d case died in thirty-six hours, probably from exhaustion, as he rallied well after the operation. Frattini's case was doing well when reported three days after the operation." We have thus, of five cases in which

¹ Jour. Med. Chir. Pharmacol., Bruxelles, April, 1883. See translation in Jour. Am. Med. Assoc., vol. i. p. 23, July 14, 1883.

² Lancet, 1883, vol. ii. p. 213.

the result is known, 3 recoveries and 2 deaths, or 60 per cent. of successes. Reasoning from analogy, it appears most rational to attempt the dilatation of these connective-tissue strictures. Who excises the rectum or urethra for a non-malignant stricture? Of course the matter is entirely different with regard to carcinoma of the pylorus, in which event forcible dilatation would probably lead to rupture of the diseased walls, hemorrhage or other disastrous consequences. The short duration of the operation of digital divulsion, the slight shock, the immediate and most astonishing improvement which takes place in those who recover, and the apparent permanence of the cure, notwithstanding the opinions which have been expressed that recontraction would occur, attest the excellence of this operation, and inevitably leads me to the conclusion that the medical profession is immensely indebted to Prof. Loreta for the development of this procedure, which as yet has not received the attention which it deserves.

Casati¹ says digital divulsion presents three great advantages over resection: 1st. Its execution is easier. 2d. It is less dangerous. 3d. The conservation of a portion of the stomach which has certainly some office in the function of digestion which would be sacrificed by resection. The statistics amply prove the first of these propositions. The average duration of the four operations of divulsion was $32\frac{3}{4}$ minutes; the cases in which excision was performed for ulcer required 5, 2, and $1\frac{1}{2}$ hours respectively; the length of the other cases not being known to me. That it is less dangerous is probable, as six excisions of the pylorus were followed by 50 per cent. of recoveries, six digital divulsions, if we include as a failure the case which was doing well on the third day when reported, by 50 per cent. of recoveries, or, if we exclude this, the average of recoveries in the five cases in which the termination is known is 60 per cent. The last proposition quoted scarcely holds a very great value, as the result of the extirpation of almost the whole stomach of a dog by Kaiser was perfect digestion and absolute increase in weight, so that when the animal was killed for experimental purposes in 1884,² eight years subsequent to the mutilation of his stomach, he was in much better condition than previous to the operation. Further, those patients who have recovered from pylorotomy have enjoyed good digestion, and have not appeared to suffer from the loss of the excised portion.³

CONCLUSIONS.—As in croup stenosis of the air-passages is the indication for tracheotomy, so stenosis of the pylorus is the indication for any operation upon this portion of the stomach in cancerous affections. If the patient simply suffers pain or distress, let him have opium freely enough to overcome it. There is no probability that an operation would effect a

¹ *Raccoglitore Medico*, 1883, p. 81.

² Maurer, *Arkiv für Klin. Chirurg.*, 1884, Bd. xxx. Heft 1.

³ According to *Revue Médicale*, Prof. Loreta has practised digital divulsion of the pylorus five times with success. He says: "Resection of the pylorus for simple and cicatricial stenosis should be replaced by digital dilatation."—*Med. News*, Feb. 28, 1885.

permanent cure, and the mortality is too great to perform it for a slight temporary benefit. Let such patients have anodynes.

When stenosis is present, as is indicated by obstinate vomiting, dilatation of the stomach, scanty stools, and marked emaciation, something must be done, or the patient will die of starvation. If the patient is young, with a considerable degree of strength, and the tumor circumscribed and not adherent to the surrounding organs, a resection may be performed, with however only a prospect of saving one-half of those submitted to it.

When, however, the patient is feeble, or aged, and there are adhesions to the pancreas or infiltration of the neighboring glands, resection ought not to be performed. In such cases gastro-enterostomy would effect all that could be expected from resection, with less immediate danger, and would be much more satisfactory than duodenostomy, or gastrostomy with a tube pushed through the stenosed orifice. In fact I do not think I would be far wrong in assuming that better results would follow gastro-enterostomy in all cases, though I hold it to be justifiable to perform pylorotomy in those very exceptional cases in which there are no adhesions or extended glandular involvement, and the strength of the patient is still fairly good.

For stenosis due to ulcer or to corrosive liquids which have been swallowed, whilst resection if successful is probably permanent in its effects, I think the results obtained by Loreta from digital divulsion demand our most earnest attention. In my opinion divulsion should be substituted for resection in all cases of simple cicatricial stenosis which are amenable to this treatment. I can readily imagine a condition in which the development of cicatricial tissue has gone to such an extent that digital divulsion would be impossible; in such cases pylorotomy remains, or what would be still better in some cases gastroenterostomy.

SUMMARY.—1st. In cancer of stomach not producing stenosis, give anodynes in quantities sufficient to relieve distress, and do not operate.

2d. Pylorotomy for carcinoma is followed by 76 per cent. mortality; hence it should only be very exceptionally performed—in those cases where, with marked stenosis, the pylorus is not adherent to the neighboring organs, and the patient is young and fairly strong.

3d. In other cases of carcinomatous stenosis, as only very temporary benefit can be obtained, perform gastro-enterostomy.

4th. In cicatricial stenosis perform digital divulsion, but, if this is impossible, owing to great thickening of the walls, resection in those who are well nourished, and gastro-enterostomy in the debilitated will both be followed by good results.

5th. In the opinion of the writer hemorrhage or perforation from ulcer or other cause than stenosis does not present indications for pylorotomy.

6th. Duodenostomy, gastrostomy for the passage of a tube, and complete gastrectomy should all be replaced by gastro-enterostomy.

ARTICLE III.

REPORT OF A CASE OF PARTIAL PYLORECTOMY. By J. M. SPEAR, M.D.,
of Cumberland, Md.

S. R. W., aged 40, blacksmith, without known hereditary predispositions, suffered from symptoms of chronic gastritis for four years previous to August, 1880, at which time the morbid condition culminated in gastric ulcer, with such violent symptoms, as pain, hæmatemesis, etc., that I interdicted stomachic ingestion, substituting therefor rectal alimentation. This regime was inviolably adhered to for five weeks, after which time food was sparingly and guardedly allowed by the stomach without a recurrence of his former dyspeptic symptoms. In fact, his stomach seemed perfectly restored; he gained flesh rapidly (running up from 120 to 166 pounds in a short time), and remaining in apparent perfect health for about two years. After this length of time he would come to me only occasionally with symptoms of gastric catarrh, lasting generally only a few days; until the latter part of 1883 and the beginning and spring of 1884, when his attacks became more frequent and more prolonged, and his symptoms more obstinate, and occasionally attended with vomiting.

In the spring of 1884 he abandoned his trade and accepted the appointment of street supervisor; his condition through the summer became more grave, and as fall approached his gastric trouble became constant; he was never entirely free from dyspeptic symptoms for more than a few hours at a time, and vomiting was habitual. Nothing that he could eat agreed with him; the yolk of hard-boiled eggs being most acceptable, upon which he largely subsisted. He could, however, eat a full meal and feel tolerably comfortable for a few hours; then sour eructations would come on, with the emission of large quantities of gas, attended with, perhaps, headache, feverishness, and a general uneasiness, to be relieved only by vomiting. His appetite remained good throughout his sickness; he had, in the latter part of his sickness, no actual pain, and seldom any tenderness; the bowels never moved spontaneously.

In November his vomiting became systematic. At intervals of two or three days, usually in the night, he would vomit large quantities of ingesta (a gallon or more) without nausea, the vomiting being generally excited by some movement in bed, and often beginning while asleep.

At this time I could run a gallon of water into the stomach without his experiencing any feeling of distension, or discomfort; it immediately returned with the residual contents, often to the amount of ten or twelve pints. The vomited liquids often had a yellowish tinge, but never showed any reaction of bile, and bismuth by the mouth failed to color the stools, showing that the stenosis, which was believed to be cicatricial, amounted practically to occlusion. He had now become very much emaciated, and so weak that he no longer left his bed. Food per orem caused him so much distress, and afforded him so little nourishment, that it was on the 14th of December withheld, and nutritive enemata, consisting principally of beef peptonoids, substituted. With these his dyspeptic symptoms ceased entirely, as did his vomiting, except when a trial was made of the stomach's tolerance, an encroachment invariably resented. For three weeks he felt quite comfortable under this treatment, complaining of noth-

ing but hunger, his strength keeping up remarkably well, considering his reduced condition.

On January 2d I asked Drs. C. H. Ohr, D. P. Welfley, and W. W. Wiley to see the case with me to consider the advisability of operative interference. They all concurred in the opinion that an operation was indicated, with, at that time, a fair prospect of success. In the week ensuing, while the patient considered the matter, he weakened quite rapidly, so that his condition on the 9th, when again seen by the above-named physicians, was found far less favorable than at the previous consultation; but, still considering the operation justifiable, we determined to give him the benefit of the chance.

Accordingly at 11 o'clock, January 10, assisted by Drs. Ohr, Wiley, Welfley, Doerner, and McClintock, I undertook the operation, which was a modification of Billroth's, and required an hour and a half in its performance. The anæsthetic used was Barr's Mixture, of which four and a half ounces were sufficient to preserve complete anæsthesia during the whole time occupied by the operation. The temperature of the room was kept between 80° and 90° F. The sponges, cloths, instruments, and hands of assistants were thoroughly disinfected, and strict cleanliness enforced. The water used to moisten sponges and cover instruments was a two per cent. solution of carbolic acid kept warm by being frequently renewed. The ligatures and sutures were animal—very fine silk—sublimatized in a solution of 1-2000 and waxed with carbolized wax 1-20. Small cambric needles were used. The extremities were wrapt in blankets, and bottles of hot water held in readiness. Shortly before the operation he was given a pint of peptonized milk and three ounces of whiskey per rectum. Pulse of patient 80°, temperature normal, no palpable tumor or evidence of disease in any other part than the stomach.

The surface of the abdomen was thoroughly washed with soap and warm water and afterwards with the carbolic solution. The stomach was washed out the day preceding with a solution of boracic acid, but as the effort had weakened him considerably, it was deemed imprudent to undertake it on the day of the operation.

An incision two inches long was made to the right of the median line midway between the umbilicus and costal margin, to which latter it was parallel, hemorrhage being arrested as the dissection proceeded. With two fingers the abdomen was explored, the pylorus located and found free from adhesions, and the omenta free from enlarged or indurated glands. A sponge was next introduced into the abdomen, the scissors applied over it, and the incision prolonged from, or a little to the left of, the median line, four and a half inches in the direction already indicated. The pylorus was lifted into view, appearing quite natural externally as regards size, color, etc., but showing marks of cicatrization on the superior part, and extending about two inches along the lesser curvature of the stomach, to which extent the wall felt very much thickened and indurated. The point of the little finger, invaginating the thin wall of the stomach above, or the duodenum below, failed to enter the constriction, but two fingers used conjointly in this way located the most constricted part very exactly.

The next step was to separate the greater and lesser omenta, which was done mainly by the fingers and forceps, with the use of only two double ligatures to masses of the omentum, in one of which was divided the gastro-epiploica dextra artery. The isolated part was then drawn through the abdominal incision, and a folded carbolized linen cloth placed under

it, securing the contents of the abdomen, affording a platform upon which to work, as well as furnishing an absorbent for the blood. An incision was begun at the lesser curvature of the stomach, a short distance above the pylorus, and carried obliquely towards the latter through the thickened wall into the cavity. The wall was found to be not less than three-fourths of an inch thick; the thickening being limited to the upper part of the pylorus and lesser curvature of the stomach, terminating abruptly with the pyloric sphincter. The stomach and duodenum were both found quite empty. The scissors were then applied to the duodenal side of the constricting tumor, circumscribing it, and the incision carried into the first incision, terminating at its lower extremity. It was found that while we had a large entrance into the duodenum, not unlike the case reported by Van Kleeef, the orifice into the stomach would not admit the finger, necessitating the excision of more of the thickened wall in order to get sufficient calibre, as well as more pliable material for suturing.

We had now removed a triangular-shaped piece from the doubled viscus, the lower angle reaching beyond the centre, leaving the most dependent point of the pylorus intact. In separating the omenta and making the above incisions, the hemorrhage, which altogether was quite insignificant, as only eight arteries required ligating, was arrested at each step.

The parts were coaptated, and secured by three "occlusion" and eleven "ring" Lambert sutures, the abdominal cavity was sponged dry, the external incision closed by two quilled and eight interrupted sutures, and dressed with an antiseptic compress and bandage.

During the operation several hypodermics of whiskey were given, and immediately after the operation a hypodermic of morphia and atropia. The patient rallied well from the effects of the anæsthetic, regaining consciousness in a few minutes, and expressed himself as being comfortable. Pulse at this time 120, and of fair strength. He was given an enema of peptonized beef and whiskey. He apparently did well for an hour and a half after the operation, after which time his pulse became frequent and weak, and in spite of our efforts to sustain him with cardiac stimulants and tonics hypodermically, his heart failed him two hours and a half after the operation. No autopsy.

Competent microscopists examined the specimen, and found nothing indicative of malignancy.

His becoming rapidly worse after changing his occupation I attribute to the want of the accustomed succussions and little concussions received in the bent-over position, during the act of shoeing horses (at which he was occupied a greater part of his time), which thus acted as an auxiliary means of emptying the stomach.

In looking back upon the case, I now, as I did then, regard it as a case in every way eminently proper for the operation, if performed in time; but as it was, it must be regarded as a "too late" operation.

ARTICLE IV.

ALCOHOLIC PARALYSIS. By HENRY HUN, M.D., Lecturer on Nervous Diseases in the Albany Medical College.

THE immediate and transient effects of an excessive quantity of alcohol upon the human nervous system, whether they are manifested in the form of drunkenness, or of delirium tremens, or of an acute attack of insanity, are well known. Scarcely less evident are the effects produced upon the nervous system by a less excessive, but a more prolonged abuse of alcoholic drinks. These effects may be manifested either in a general failure of physical and mental power, or in a form of disease closely resembling progressive paralytic dementia, or in various forms of chronic insanity, or in epilepsy, or in neuralgia, or in paralysis. In the acute form of alcoholic poisoning, no change in the structure of the nervous system has been found, except that the meninges in common with the internal organs and the mucous membranes are the seat of a very decided injection and of a slight exudation. In the chronic form of alcoholism, a number of pathological changes have been discovered in the nervous system, which, however, vary greatly in different cases. The pathological conditions most commonly found are, pachymeningitis interna hæmorrhagica, thickening and opacity of the pia mater, serous exudation in the sub-arachnoid space, dryness and toughness of the cerebral substance, atrophy of the cerebral convolutions, fatty degeneration of the nerve-cells,¹ and degenerative changes in the peripheral nerves.²

Of late years the paralysis which results from the abuse of alcohol has been accurately described by numerous observers, and the attempt has been made to discover the lesion of the nervous system which is associated with this form of paralysis. The two cases here reported seem to be typical examples of this disease, and may contribute somewhat to a better understanding of it.

CASE I.—A male, æt. 28, single, entered St. Peter's Hospital September 13, 1884, and gave the following history:—

Family history good. Patient has always worked hard, and has enjoyed good health until a year ago. Has never had any venereal disease, but has always been a hard drinker, although he has never had delirium tremens. During many years he has drunk steadily and excessively, and during the year previous to this sickness he has drunk more than half a pint of undiluted bad whiskey daily. He had no settled home, but slept about wherever he could find a place. Last winter he "caught cold," and on endeavoring to get out of bed the next morning he could not do so on account of general weakness, pains in legs and arms, and inability to walk. He was

¹ Wilks, *Journal of Medical Sciences*, 1864.

² Dejerine, *Archiv. de physiol. norm. et Pathol.*, 1884, No. 2, p. 231. *Lancereaux, Gazette Hebdom.*, 1881, Nos. 45 and 118.

obliged to stay in bed for a week, during which period there were a numbness and tingling in his feet and legs. On getting out of bed, and on endeavoring to walk, he was obliged to run forward to prevent himself from falling. He continued in the same condition for about two months, during which time improvement slowly continued, and after a time he could walk about as well as ever. About a month ago, the patient began to feel the disease returning, and in the course of a few days the same symptoms that he had last winter came on again, so that he was unable to walk. From this time until he entered the hospital he suffered from pain, numbness, and tingling sensations in his legs and arms on both sides, and from great loss of strength in his legs, and in a less degree in his arms. He also was troubled by frequent micturition, and by a sensation of soreness over the abdomen, but no girdle sensation. Appetite poor, and frequent vomiting.

An examination at the time of entrance gave the following result: Patient is of strong frame, and well nourished. He seems to be somewhat under the effects of liquor; he talks and acts in a foolish manner, and is tremulous; his stomach is irritable; the end of his nose is much enlarged and congested, and an acne eruption covers his face. Slight paresis of left side of face, but not of tongue nor of ocular muscles. Pupils equal, and react sluggishly to light and to efforts of accommodation. No absolute paralysis, but general paresis of muscles, of arms, and hands. Grasp of hands registered with Mathieu's dynamometer is, left 45, right 75. Patient cannot perfectly extend the last two fingers of each hand. Decided tremor of hands during voluntary movements. Considerable degree of ataxia in movements of left hand, a somewhat less degree of ataxia in movements of right hand. Patient has not the violent ataxic movements of locomotor ataxia, but rather the tremulous uncertain movements of the drunkard. No decided atrophy of muscles of arms. Sensibility to tactile impressions over hands, arms, and legs normal, except for small patches of anæsthesia to slight tactile impressions over feet. Decided hyperæsthesia of skin, and great tenderness of muscles on pressure. No decided atrophy of muscles of legs. Patient walks with great difficulty. In walking he flexes his thigh strongly on his body, and then brings his foot down with a stamp in the manner described by Westphal.¹ His movements are very rapid and uncertain, and he constantly appears to be just on the point of falling. His walk exhibits a mixture of weakness and ataxia. Patient cannot stand with his feet close together, unless he is given some little support. When slightly supported he apparently stands as well when his eyes are shut as when they are open, although he says that he feels more dizzy in the former case. When he attempts to stand his whole body is thrown into a tremor. When in bed he can move legs freely in all directions, and such movements show a slight degree of ataxia. Plantar, cremasteric, and umbilical reflexes normal; no patellar reflex; no ankle clonus; no paradoxical contraction; no rigidity, nor deformity of spine; no tenderness over spinous processes; slight tenderness in lumbar region on each side of the spinous processes over the muscle. Abdominal and thoracic examination negative, except that a short faint systolic murmur is heard over aortic valves and in subclavian arteries. No enlargement of the area of cardiac dulness. R. Blisters along spinous processes. R. Pot. iodide grs. xv, t. i. d.

¹ Charite Annalen, iv. Jahrg. 1879, p. 395.

Oct. 7. Patient has slowly grown worse. The legs are very weak in all their movements, and exhibit a decided degree of ataxia. Small patches of anæsthesia to tactile impressions scattered not only over feet, but also over legs. Sensibility to painful and thermic impressions normal; muscles painful on pressure; can neither walk nor stand. Patellar reflex absent. Plantar reflex exaggerated, and cutaneous reflexes of any part of skin of legs greatly increased, which seems to be due to a hyperæsthesia of skin of legs; cremasteric reflex normal; umbilical reflex slight; pupil reflex normal. Slight degree of ataxia of hands. Grasp of right hand equals 60 as registered by Mathieu's dynamometer. No tenderness along back. Slight paresis of left side of face, but this is less than on entrance. The congestion of the nose is very much less, and there is only a slight degree of tremor remaining. Patient sometimes loses his legs in bed, so that he cannot tell in what position they are. R. Pot. iodide grs. xxv, t. i. d.

14th. The large doses of iodide cause much discomfort, producing an intense coryza, and a severe conjunctivitis. Paresis of left side of face has almost entirely disappeared. Muscles of legs flabby and atrophied. Muscles of legs decidedly tender on pressure. No pain on passive motion. Patient is quite unable to walk. Circumference of thigh two inches, above knee is 12 inches. Greatest circumference of calf of leg $11\frac{1}{2}$ inches.

Nov. 10. No decided change; patient is rather stronger. The coryza and conjunctivitis disappeared after about ten days, but he now has an extensive eruption of acne. Omit the iodide. R. Faradic current to arms and legs. R. Strychniæ sulph. gr. $\frac{1}{30}$, t. i. d.

Dec. 1. Decidedly better. Can walk a little once more.

15th. Patient is decidedly better. Can walk and stand for a short time. His walk is still very unsteady, and stamping as at time of entrance. Can button his clothes once more, which for a long time he was unable to do. No facial paresis. Ataxic movements are very slight. Grasp of hands strong. Sensibility to tactile impressions over both arms and legs normal. Localization of tactile impressions normal, except as regards the toes; the patient not being able to tell always which toe is touched. Sensibility to painful and thermic impressions normal. No retardation of conduction of painful nor tactile impressions. Patellar reflex and ankle clonus absent. Cutaneous reflex exaggerated. Circumference of thigh three inches above knee-joint, right $12\frac{1}{2}$ inches, left 12 inches. Greatest circumference of calf of leg, right 11 inches, left $10\frac{1}{2}$ inches.

Electric examination made with the MacIntosh combined battery.

The positive pole on upper part of sternum, the negative pole on point to be tested.

Faradic current.

Peroneus nerve,	right, cylinder withdrawn $1\frac{3}{4}$ inches.
"	left, " " $1\frac{3}{4}$ "
Tibialis anticus muscle,	left, " " 3 "

but the contraction becomes much stronger as the electrode is slowly moved outwards towards the head of the fibula and the peroneus nerve. No contraction can be obtained from the right tibialis anticus muscle when the electrode is over the muscle itself, but when the electrode is held midway between the motor point for the muscle and the head of the fibula a sluggish contraction is obtained when the cylinder is withdrawn $3\frac{1}{2}$ inches; when the cylinder is withdrawn more the contraction of the muscle loses its sluggish character and appears normal. A sluggish contraction

of vastus internus muscle on both sides when cylinder is withdrawn $2\frac{3}{4}$ inches.

Nerves of arms and muscles on anterior surface of forearm respond when cylinder is entirely in. Extensor muscles of forearm and muscles of base of thumb respond, quick contraction, when cylinder is withdrawn $1\frac{1}{4}$ inches.

Galvanic current measured in milliampères by a Gaiffe galvanometer.

Right peroneus nerve,	negative closing, $5\frac{1}{2}$; positive closing, 13
Left " " "	" " $5\frac{1}{2}$ " " 12
Right tibialis anticus muscle,	" " 14 " " 11
Left " " "	" " 10 " " $8\frac{1}{2}$
Right vastus internus,	" " $20\frac{1}{2}$ " " 17

The extensor longus muscle gave no response to currents even stronger than those given above.

29th. Is up and out of bed ; can walk easily, though rather awkwardly and unsteadily. Can stand with feet together and eyes shut without wavering, although he complains then of feeling a little dizzy. Very slight tenderness of muscles still remains. Grasp of left hand 90, right hand 100, as registered with Mathieu's dynamometer. A careful ophthalmoscopic examination revealed nothing abnormal.

Jan. 26, 1885. Galvanic current measured in milliampères by a Gaiffe galvanometer.

Right peroneus nerve,	negative closing, $6\frac{1}{2}$; positive closing, 12
Left " " "	" " 7 " " 13
	" " opening, 20
Right tibialis anticus muscle,	" " 15 " " closing, 11
Left " " "	" " 13 " " 18

Faradic current.

All the muscles and nerves of arms and thumb respond readily when the cylinder is entirely in ; the muscles of the right arm responding more actively than those of the left.

Peroneus nerve,	left, cylinder fully in ;	right, cylinder withdrawn 1 inch.
Tibialis anticus muscle, left,	" withdrawn 2 inch ;	right, " " $3\frac{3}{4}$ "
Extensor longus muscle, left,	" " $3\frac{1}{4}$ "	right, " " $3\frac{1}{2}$ "
Vastus internus muscle, left,	" " $1\frac{3}{4}$ "	right, " " $1\frac{3}{4}$ "

Patient can now walk without difficulty ; can stand on either leg alone, and feels strong. Grasp of hands measured with Mathieu's dynamometer is, right 115, left 100. There is no ataxia. Patellar reflex present in both legs ; plantar reflexes increased ; cremasteric and umbilical reflexes normal. No hyperæsthesia of skin of legs, nor tenderness on pressure over the muscles. Sensibility to tactile, painful, and thermic impressions normal. Slight failure of localization on toes. No fibrillary contraction of

¹ In making the electrical examinations in this and the following case the 18 cell combined MacIntosh battery was employed. A large sponge electrode was placed over the upper part of the sternum, and a small electrode (a metallic knob $\frac{1}{2}$ inch in diameter and covered with a sponge) was placed over the motor point to be tested. The strength of the faradic current required to produce a minimal contraction was measured by the distance to which the metallic cylinder had to be withdrawn ; while the strength of the galvanic current was measured in milliampères by a Gaiffe galvanometer, and the strength of the current was regulated by a rheostat.

muscles; circumference of thigh three inches above knee-joint where the thigh is smallest is, left $13\frac{1}{2}$ inches, right $13\frac{1}{4}$ inches. Greatest circumference of calf of leg is $12\frac{1}{2}$ inches, and is the same on each side.

The cardiac murmur has disappeared. Slight murmur in carotids on deep pressure.

CASE II.—A male, æt. 28, single; by occupation a barber; examined Oct. 23d, 1882. Until the past year patient has always enjoyed good health, and denies ever having had any venereal disease. He has for a long time indulged too freely in alcoholic drinks, and for six months previous to his present illness he had been continuously under the influence of liquor, although he did not have any attack of delirium tremens. As long as a year ago it was noticed that he seemed to be lazy, and it is only recently that his family have seen that his laziness is due to weakness. During the past year he has frequently said and done very foolish things, and during the months of last August and September he stayed away from his home and could not be induced to return to it, because he imagined that his family were not treating him as they ought.

During the past six months he has been gradually but evidently losing strength in his legs, and during the past month or two he has also been losing strength in his arms. His memory has also failed greatly, and at times he talks in a foolish manner. During the past two weeks he has been confined to his bed by weakness, and during the past week he has been unable to sit up in bed without assistance. About a week ago he slipped off his chair and was unconscious for a quarter of an hour, during which time he had general convulsive movements, but did not bite his tongue.

Complains now of general weakness, of numbness of hands and feet, and of severe pricking pain under his nails. No other abnormal sensations in legs or arms. Says that left arm and leg are weaker, more tender, and more painful than the right. Some time ago had a slight pain in his back, but not lately. Has not had any headache, no noises in ears or head, but is dizzy at times. Insomnia. No cough nor pain in chest. Appetite has been good, but is poor now; digestion good. Bowels slightly constipated. No delusions, but patient is very hopeful, and treats his sickness very lightly.

No facial nor ocular paralysis. Tongue protruded straight. Pupils equal, and react normally. Speech is at times normal, at other times indistinct and explosive. General hyperæsthesia of arms, legs, and body, especially of abdomen and calves of legs. He shrinks away in a nervous manner from the slightest touch on the abdomen. With the exception of the hyperæsthesia the conduction of tactile, painful, and thermic impressions is normal. No retardation of the conduction of pain. No absolute paralysis of any muscle, but a very extreme degree of paresis of all muscles. Can scarcely walk when supported on both sides. Grasp of hand weak. All movements are painful—legs greatly emaciated. Arms scarcely at all so. Very slight ataxia of legs. Movements of fingers awkward. Patellar reflex absent. Cutaneous reflexes well marked. Neither tenderness nor rigidity nor deformity of head or spinal column. Left arm and leg seem weaker than the right.

At this time the patient was taking several grains of opium daily to procure sleep. This was ordered to be gradually diminished. He was also chewing tobacco freely, and this he would not entirely stop, but consented to reduce the quantity.

The galvanic current was applied daily for ten minutes, the positive pole on the nape of the neck, and the negative pole rubbed over the arms and legs, and liq. potass. arsenitis mij was given three times a day, and a laxative pill at night.

November 25. Has steadily lost strength. Can move his left leg but little, and cannot raise the right foot from the bed. Cannot raise himself up in bed. Movements of the arms are also weaker, and he cannot execute any delicate movements. All the muscles of the body have rapidly atrophied, so that the patient is much emaciated.

Complains greatly of neuralgic pains and of cramps in his legs, and he always feels cold. General hyperæsthesia of the skin, and pain on compressing the muscles still continues. Bladder and rectum act normally but sluggishly. Eats very little, and does not sleep well, although he takes a couple of grains of opium at bedtime. Mental condition is very variable; at one minute he talks sensibly and the next minute is very delirious. The application of the electricity causes him much pain. The liq. potass. arsenitis was omitted, and in its place a pill composed of ferri redacti grs. ij, and strychniæ sulph. gr. $\frac{1}{30}$ was given t. i. d.

December 10. The general muscular atrophy continues to increase. There is no fibrillar contraction of the muscles even when they are mechanically irritated, except in the case of the right gastrocnemius after the application of electricity; this muscle manifesting fibrillar contraction for an hour or more after the application of electricity. In all other respects, except the muscular atrophy, he has improved. He cannot stand, but he can raise himself up and sit on the edge of the bed and get into bed again without assistance. He can raise his right foot easily from the bed. The patellar reflex is still absent. His movements are slow, stiff, awkward, and painful. The hyperæsthesia of skin and muscles is much less marked, and he complains less of pain and cramps in legs and numbness of hands. Is less sensitive to the electricity. His appetite is better, and he sleeps better, although he takes only $\frac{1}{2}$ gr. of opium at bedtime, now.

All the muscles of the arms and legs respond readily to the faradic current when a strong current is employed. (The instrument made by the Galvano-Faradic Manufacturing Co., New York, two cells being in operation, and the metallic cylinder withdrawn 4 inches.) The extensor longus digitorum of left leg, however, will not respond to any force of the current; and in general the muscles of the left leg respond less readily than those of the right leg.

The electro-motor excitability, as shown by the galvanic current, was measured in milliampères by a Gaiffe galvanometer.

Peroneus nerve,	negative closing,	{ right, 6 milliampères. left, 6 "
Tibialis anticus muscle,	" "	{ right, 5 " left, 5 "
Ulnaris nerve at elbow,	" "	{ right, $2\frac{3}{4}$ " left, $2\frac{3}{4}$ "
Median nerve at elbow,	" "	{ right, $2\frac{3}{4}$ " left, $2\frac{3}{4}$ "
Flexor sublimis digitorum, 2d & 3d fingers,		{ right, 3 " left, 4 "
negative closing,		{ right, $3\frac{1}{2}$ " left, $3\frac{3}{4}$ "
Flexor sublimis digitorum, 1st & 4th fingers,		{ right, $3\frac{1}{2}$ " left, $3\frac{3}{4}$ "
negative closing,		{ right, $3\frac{1}{2}$ " left, $3\frac{3}{4}$ "

January 5, 1883. Great and general diminution of the excitability of the muscles to the faradic current. The flexors of the index fingers contract but very slightly to the strongest faradic current. The extensor longus digitorum of left leg does not respond at all to the faradic current, and the corresponding muscle of the right leg responds but very slightly. After this date there was no examination of the muscles made with the faradic current.

24th. Excitability of the muscles to the galvanic current expressed in milliamperes is as follows:—

Peroneus nerve,	{ right, negative closing, $1\frac{1}{2}$; positive closing, $3\frac{3}{4}$
	{ left, " " $2\frac{3}{4}$; " " $6\frac{1}{2}$
Tibialis anticus muscle,	{ right, " " 3; " " 6
	{ left, " " 3; " " 8
Extensor longus digito- rum,	{ right, " " 5; " " 7
	{ left, no reaction could be obtained.
Median nerve at elbow,	{ right, negative closing, 2; positive closing, 6
	{ left, " " 5; " " 8
Ulnar nerve at elbow,	{ right, " " $3\frac{3}{4}$; " " 3
	{ left, " " $3\frac{3}{4}$; " " 3
Flexor sublimis digito- rum, 2d & 3d fingers,	{ right, " " 4; " " 7
	{ left, " " 4; " " 7
Flexor sublimis digito- rum, 1st & 4th fingers,	{ right, " " 3; " " 5
	{ left, " " 3; " " 5

On the right side the index finger moves more than the little finger, while on the left side the little finger moves more than the index finger. All the muscles respond even to a very strong galvanic current only by very slight contraction. The electrical examination is rendered very difficult by the great irritability of the patient.

The general atrophy of the muscles of the arms, legs, face, and body has steadily increased, and he is approaching the condition of a living skeleton. There is no fibrillar contraction of the rapidly atrophying muscles. He can move himself about in bed much better than when I first saw him, but not so well as he could a month ago.

He is very averse to getting out of bed. Grasp of hands is weak. His feet are drawn down and held rigidly in a condition of plantar flexion. Toes also held in position of plantar flexion. Sensibility to tactile, painful, and thermic impressions intact. The hyperæsthesia of skin and muscles has almost entirely disappeared; and the hyperæsthesia of the abdomen is very slight. He is still a little nervous about having his abdomen touched, although he himself can make firm pressure upon it. His appetite is rather better. For a long time his mind was quite clear, but for the last day or two he has again been a little delirious.

All medicine was omitted except a laxative and a hypnotic pill at night.

R. Iodide of potassium, grs. vi, was given t. i. d.

February 5. No decided change, except that he is eating better, and requires no hypnotic. Indeed, he sleeps the greater part of the day and night. Iodide of potassium was increased to grs. x, t. i. d.

Circumference of knee-joint,	12 inches.
Circumference a little below knee,	$7\frac{1}{2}$ "
Greatest circumference of calf of leg,	7 "
Greatest circumference of thigh,	$7\frac{1}{2}$ "

Measurements are the same on both legs.

Patient refuses any further application of electricity on account of the pain it causes.

March 5. Has eaten almost nothing lately. Will not even take milk. Is very weak. Has emaciated so much that he is almost nothing but skin and bone. Muscles of face partake in the general atrophy. Can move his hands and arms pretty well. Grasp of hand as measured by Mathieu's dynamometer shows left 25, right 38. Slight voluntary motion of muscles of thigh is still retained. Complete paralysis of muscles below the knee. Slight dulling of sensibility of skin of feet and lower leg to tactile, but not to painful impressions. Well-marked retardation (about two seconds) of conduction of painful impressions from feet. Skin of legs is still somewhat hyperæsthetic, and passive motion of leg causes much pain. No tendon reflexes. Cutaneous reflexes well marked. Patient will not permit an electrical examination to be made. Bowels regular. Pulse rapid, weak, dichrotic.

13th. Yesterday a decided change appeared in patient. Lies in a semi-comatose condition, from which he is easily aroused to answer questions. Answers are rational. Bowels are regular. Urine free, and he asks for bed-pan and urinal when he needs them. During the past three days the left arm has become paralyzed. The paralysis appeared first in the deltoid, then extended to biceps and triceps, and then to muscles of forearm, very slight motion of fingers and hand alone remaining. Motion of right arm is almost as good as it was a week ago. The muscles of the legs are completely paralyzed. Cannot raise his voice above a whisper. Will drink only a little wine.

15th. Consciousness clear. Voice growing gradually weaker. Has an occasional dejection in bed.

16th. Died quietly last night.

17th. Autopsy thirty-six hours after death.—Extreme emaciation of whole body. Several spots of purpura hæmorrhagica over anterior aspect of left upper arm. No hypostasis. Post-mortem rigidity not present. Muscular tissue very slight in amount. No decided replacing of muscular fibres by connective tissue could be seen by the naked eye.

No decided abnormality about thoracic or abdominal organs except general atrophy and dryness.

Brain.—Veins of pia mater full of blood. Unusually large quantity of sub-arachnoid fluid over the surface of the hemispheres. No enlargement of the ventricles, and very slight atrophy of the cerebral convolutions. Sections through the hemispheres, the ganglia at the base, and the cerebellum, appear normal to the naked eye.

Spinal Cord.—Slight adherence of the dura and the pia mater in the cervical region of the cord, but no marked congestion of the membranes nor other sign of meningitis. On section, the spinal cord appears normal to the naked eye.

Microscopic Examination.—A number of sections of several parts of the cortex, especially of the central convolutions, show a decided degeneration of the nerve-cells in the cortex. Although the brain is well hardened the nerve-cells are so granular that their nucleus can scarcely be made out, and the cells themselves are rounded and contracted so that, instead of being surrounded by a small lymph space, they seem to be lying in large cavities. There is also a slight increase in the number of small round cells in the cortex and in the adjoining parts of the white

matter. A large number of sections of the medulla oblongata and spinal cord, especially of the cervical and lumbar enlargements, show these organs to be entirely normal, and in particular the nerve-cells in the anterior horns are unusually well stained and sharply defined.

Unfortunately, pieces of the peripheral nerves and muscles were not preserved.

If we review in a general way the symptoms of these two cases, we find: First. Sensory disturbances in the form of neuralgic pains and paræsthesiæ, pain on pressure over the muscles and on passive motions, a mixture of cutaneous hyperæsthesia and anæsthesia, and retardation of the conduction of pain. Second. Motor disturbances in the form of muscular weakness, which rapidly increases in intensity and is accompanied by muscular atrophy without fibrillar contraction and by the electrical reaction of degeneration, or at least an approach to this reaction. And, third. Ataxic disturbances which are associated with a loss of the tendon reflexes, while the cutaneous reflexes, especially the plantar reflex, are increased. All these disturbances are symmetrically distributed. They appear first and most decidedly in the legs and then extend to the arms, where they are less severe. Associated with these symptoms is a greater or less degree of mental weakness and derangement.

Such a combination of sensory disturbances, absence of patellar reflex, ataxia, muscular paralysis and muscular atrophy, is very uncommon, and there can be but little doubt that these two cases which possess these and other characters in common are due to the same lesion. There is, however, a great difference in the severity of the symptoms in the two cases. In the first case the initial sensory disturbances and the cutaneous and muscular hyperæsthesia were only slightly marked, the pain on passive motion was entirely absent, and there was only a slight degree of muscular atrophy. In the second case, not only were all these symptoms extremely well marked, but in addition there was retardation of the conduction of pain, and the disease terminated fatally after the muscular atrophy had become so extreme that the patient was reduced to the condition of the so-called "living skeletons."

In regard to the anatomical lesion associated with these symptoms, it is evident that it must be situated somewhere in the cerebro-spinal nervous system; that is, either in the brain, or spinal cord, or in the peripheral nerves, or simultaneously in one or more of these divisions. The lesion cannot be in the brain alone, for no lesion of the brain can cause absence of tendon reflex, rapid muscular atrophy, reaction of degeneration, etc. All the symptoms in the case, except the mental disturbance, might be explained by a lesion of the spinal cord, provided that the lesion was situated in the anterior horns of gray matter and in the posterior columns of white matter; so that a combination of the symptoms of poliomyelitis anterior and of locomotor ataxia would result, although in these cases

several symptoms of locomotor ataxia are absent. Not only is it very improbable that two portions of the spinal cord so widely separated from each other, both by space and by function, as the posterior columns and the anterior horns, should be simultaneously attacked by disease, while the rest of the spinal cord remained healthy, but a careful examination of the spinal cord in the second case revealed no trace of disease. By a process of elimination then it becomes altogether probable that the lesion is situated in the peripheral nerves. At first sight it may seem improbable that such a general, wide-spread, primary inflammation of the peripheral nerves should occur, but it is now well known that many cases, formerly called myelitis of the anterior horns, are really due to a general neuritis of the smaller branches of the peripheral nerves, the larger trunks being only slightly or not at all affected. Leyden¹ described the disease very accurately, and gave it the name of multiple neuritis, and since that time it has been called by that name. The symptoms of multiple neuritis resemble, in respect to muscular paralysis and atrophy, very closely those of myelitis of the anterior horns, but in addition to these motor symptoms there are many symptoms of sensory disturbance, viz., neuralgic pains, paræsthesiæ, hyperæsthesiæ, muscular tenderness, anæsthesia, retardation of the conduction of pain, absence of tendon reflexes, etc.; these sensory symptoms being absent in myelitis of anterior horns; and the prominence of these sensory disturbances often enables us to decide whether a case is one of multiple neuritis or of myelitis of the anterior horns. The symptoms, therefore, of multiple neuritis are very similar to those of the two cases above reported, and in the absence of any change in the spinal cord of our second case, it is very probable that the lesion was in the peripheral nerves, and especially so since, in some cases of alcoholic paralysis reported by Lancereaux,² Dejerine,³ and others, degenerative processes were found in the peripheral nerves, while the spinal cord was healthy.

The supposition of a general neuritis would explain the symptoms of these cases very well. The inflammation of the nerves would account for the neuralgic pains and the paræsthesiæ which are met with in the commencement of the disease. Along the inflamed nerves the conduction of nervous impulses would be both difficult and painful, and would thus give rise to muscular weakness and hyperæsthesia, and perhaps, also, to the retardation of the conduction of pain. The inflamed and degenerated nerves would naturally give rise to the reaction of degeneration, and would cause, also, the rapid muscular atrophy; and when the nerves become destroyed by the inflammation muscular paralysis and cutaneous and muscular anæsthesia would result. The destruction of the nerve-

¹ Zeitschrift für klinische medicin, vol. i. p. 387.

² Gazette des Hôpitaux, 1883, No. 46; Gazette Hebdom., 1881, Nos. 45 and 118.

³ Archiv. de Physiol. norm. et pathol., 1884, No. 2, p. 231.

fibres of muscular sense would explain the loss of the tendon reflex, the ignorance of the patient as to what position his legs were in, and the ataxia in part at least. Of course the mental symptoms could not be due to any disease of the peripheral nerves, but must be due to a change in the cerebral cortex, and this change in the second case was found to be a degeneration and shrinking up of the nerve-cells in the cortex, and a congestion of the pia mater and effusion of serum in the subarachnoid space. The ataxia might also be due, in part at least, to cerebral disturbance, for it was associated with tremor, and in its appearance resembled the uncertain movements made by a drunken man, which form of inco-ordination is probably of cerebral origin. It seems probable, then, that the lesion of the nervous tissue occurring in alcoholic paralysis is a degeneration of the nerve-cells in the cerebral cortex, and of the nerve-fibres in the smaller peripheral nerves, while the spinal cord is normal, and the nerve-cells lying in the anterior horns exhibit not the slightest degeneration nor change.

That the disease attacks especially the small nerve branches and not the nerve trunks, is indicated in the first case by the action of the right tibialis anticus muscle to electricity. The muscular fibres respond readily to the galvanic current with a reversal of the formula, that is, the positive pole becomes the most active, but the nerve filaments are so degenerated that they cannot be directly excited by the faradic current, although they will still transmit strong impulses from the nerve trunk which remains excitable to the faradic and galvanic current. The left tibialis anticus muscle shows the same thing, but less decidedly. Indications of the same thing are furnished, though less clearly, by the electrical examination of the second case. The electrical examination of the second case was, however, much less satisfactory, and is less reliable than that of the first case, partly because of the want of a suitable place and of proper appliances for the testing, and chiefly because of the great irritability of the patient.

In regard to the treatment of these cases : iodide of potassium was in the beginning given freely to the first case. Under this treatment there was only very slight improvement, and this might well be due to the continued rest in bed. Later strychnia was substituted for the iodide of potassium, and the faradic current was daily applied to the arms and legs, and under this treatment the improvement was very rapid. The patient's back was cauterized once or twice without any apparent result. In the second case the galvanic current was employed on the arms and legs, and iron and strychnia were given externally. For a short time after he commenced taking the strychnia the patient improved decidedly, but he soon fell back again and ultimately died.

In regard to the cause of the disease, there is in each case a history of excessive drinking. In the first case, when the patient entered the

hospital he had every appearance of chronic alcoholism, general tremor, confusion of mind and speech, irritable stomach, and very well-marked acne rosacea; and he did not hesitate to confess that he had for many years drunk a very excessive quantity of whiskey, etc. In the second case the family of the patient gave an account of very excessive drinking. The fact that many other cases closely resembling these two, and all following excessive use of alcohol, have been reported, confirms the view that we have to do with cases of disease which are due to the action on the nervous system of the long-continued abuse of alcohol.

The whole subject of alcoholic paralysis is of comparatively recent date, and it is yet an open question whether or not it should be regarded as a special form of disease. A brief statement, therefore, of the cases of this disease which have been hitherto reported may lead to a better understanding of the subject.

In his great work on chronic alcoholism, published in 1852, Magnus Huss divides the nervous symptoms occurring in chronic alcoholism into a paralytic, an anæsthetic, a convulsive, an epileptic, and a hyperæsthetic form according to the symptom which is most prominent, for in any one case a number of the above symptoms may occur in a greater or less degree, and the different forms cannot always be sharply separated from each other. He attributes these symptoms to a disease of the spinal cord and medulla oblongata, although he was unable actually to demonstrate this.

The prognosis is rather favorable when the alcohol can be stopped. In 1864 Lancereaux described the forms of paralysis due to alcohol more systematically in the *Dictionnaire Encyclopédique des Sciences médicales*, and Leudet added a note to the effect that these were cases of painful paralysis. In 1867, Leudet published some cases of the hyperæsthetic form of chronic alcoholism, and considered that it was of more frequent occurrence than Magnus Huss supposed. In these cases there was not only great hyperæsthesia of the skin, muscles, and bones, but also neuralgic pains, muscular weakness, ataxia, anæsthesia, increase of cutaneous reflexes, and in one case retardation of the conduction of pain. Cerebral symptoms were present in some cases and absent in others. Leudet, like Huss, considers these symptoms as of spinal origin. In 1868, Dr. Reginald Thompson read before the Royal Medical and Chirurgical Society of England the report of a case of paralysis of the extensors due, in part at least, to alcoholic excesses.

In the *Lancet*, of 1872, Dr. S. Wilks quotes from a lecture which he delivered in October, 1867, to the effect that he has seen many cases of paraplegia in ladies who were addicted to alcoholic excesses, and says that since 1867 he has seen a number of similar cases. The symptoms of the disease, according to Wilks, are severe pains in all the limbs, especi-

ally the lower ones which are much wasted, together with numbness and considerable anæsthesia, and at the same time only slight power of movement or total inability to stand. With the addition of the akinesia, the symptoms are not unlike those of ataxia. In one case there was hyperæsthesia. Wilks considers the disease to be due to a change in the structure of the spinal cord, similar to that which takes place in the brain in chronic alcoholism (viz., degeneration of the nervous tissue and thickening of the membranes), but he offers no proof of any such change. In such cases the prognosis is hopeful, and the most important thing in the treatment is the immediate and complete stopping of all alcoholic drinks. In the same year and journal (*Lancet*, 1872), J. Lockhart Clarke published some cases similar to those of Dr. Wilks, and endorsed Dr. Wilks's views as to the cause and nature of the disease.

In 1879, Westphal¹ described a peculiar form of walking in cases of chronic alcoholism which presented a certain resemblance to locomotor ataxia. The peculiarity of this kind of walking consists in lifting the leg very high so that the thigh is flexed strongly on the body, and then bringing the leg strongly down to the ground with a stamp.

In 1881, Lancereaux² published a number of cases of alcoholic paralysis in which the disease commenced with sharp pains in the legs, followed by a combination of anæsthesia and hyperæsthesia, and a motor paresis. The symptoms are frequently confined to the legs, and when the arms are involved, the symptoms occur especially in the distribution of the radial nerves. The disease is more common in women than in men (12 women out of 15 cases), and the patients are affected by other symptoms of alcoholism. There are no contractures. The faradic electro-motor excitability is diminished or abolished. On careful microscopic examination of several cases, no change was found in any part of the nervous system except that the nerves of the affected extremities showed evident changes. The myelin was segmented and run into drops, and some sheaths were empty and collapsed, and the nuclei of Schwann were somewhat nearer together than normal. These changes did not however affect the whole of the nerve. In 1883, Lancereaux³ describes alcoholic paralysis as being symmetrical, attacking either the upper or lower extremities, and gradually extending towards the body. The lower extremities are always more affected than the upper, and the extensor than the flexor muscles. The electrical excitability is greatly diminished, and extensive anæsthesia is often present. In such cases the brain and spinal cord were found to be normal, while the muscles and the peripheral nerves showed extensive degenerative changes.

¹ *Charité Annalen*, iv. Jarhgang, 1879, p. 395.

² *Gazette Hebdom.*, Nos. 45 and 188.

³ *Gazette des Hôpitaux*, No. 46, 1883.

In August, 1882, Dr. Myrtle published in the *British Medical Journal* a rather imperfectly observed case of alcoholic paralysis, and in the same year Dr. G. Fisher¹ reported two cases of alcoholic paralysis, which were very accurately examined and described, and of which he gives the following summary:—

“Two men of a very low order of intelligence, almost imbeciles, who had no hereditary nor syphilitic taint, in consequence probably of the habitual abuse of alcohol, of excessive smoking, and of an indolent life, presented a complex of very severe disturbances of innervation, together with decided symptoms of mental derangement. The symptoms were paresis of all the muscles connected with the spinal cord, muscular atrophy with diminution of absence of the electric excitability, a remarkable hardness and remarkable sensitiveness on pressure of the paretic muscles, loss of mechanical excitability and of the patellar reflex, evident ataxia, slight initial paræsthesiæ, dulling of tactile sensibility, retardation of the conduction of pain, peculiar, but sharply defined abnormalities of the perception of pain. Remarks double perception, retardation of the cutaneous reflexes. In addition to the above symptoms there were slight febrile and gastric disturbances, rapid pulse, and signs of diminished heart force. No strong subjective symptoms in the domain of sensibility; no lancinating pains; no girdle sensation, neither rigidity nor pain, nor sensitiveness of spinal column. The vegetative functions and sphincters intact. The functions of the cranial nerves normal, except for slight abnormality of the pupil, probably due to other causes. In the first case recovery, in the second decided and permanent improvement.”

From a consideration of the symptoms in these cases Fischer concludes that the lesion is a subacute inflammation of the gray matter, the posterior columns, and the inner portion of the lateral columns of the spinal cord, and admits the possibility also of a lesion of the peripheral nerves.

In July, 1883, Dr. R. Glynn reported several cases of alcoholic paralysis in the *Liverpool Medico-Chirurgical Journal*.

At a meeting of the Royal Medical and Chirurgical Society, held on February 12, 1884, Dr. Broadbent reported a case of alcoholic paralysis in which the paralysis came on insidiously, and attacked especially the extensors; the patellar reflex was absent, and there was no disturbance of the sphincters nor of sensation. No pain, but there was hyperæsthesia. The hands and feet were pale, puffy, and purplish. (This condition of œdema was noticed in a number of cases which had been previously reported.) The case of Dr. Broadbent quickly terminated fatally, and a careful microscopic examination revealed nothing abnormal. In the discussion following this case, Dr. Wilks reiterated his views as to this disease which he had published in the *Lancet* twelve years before. He was constantly meeting with such cases, which recovered when the alcohol was withdrawn. Alcohol, in his opinion, acted on the whole cerebro-spinal system, though the spinal cord might be more affected in many cases. No change had hitherto been found in the true neural substance of the brain or cord, though these organs might be wasted and their meninges thickened.

¹ Archiv. für Psychiatrie und Nervenkrankheiten, vol. xiii. p. 1.

Dr. Buzzard spoke of a number of cases which he had seen, and called attention to the lancinating pains and the muscular atrophy which were often present. He said that in alcoholic paraplegia there was a diminution or loss of response to the faradic current, with exaggerated response to the galvanic current. These facts showed the disease to be of spinal order. In alluding to the fact that Lancereaux had found degenerative processes in the peripheral nerves, Dr. Buzzard stated that, in 1880, Mr. de Watteville had suggested that a dynamic change in the cells of the anterior horns of a temporary character might be sufficient to cause degenerative changes in the peripheral parts of the nerve-fibres.

In the summer of 1884, Dr. Löwenfeld¹ reported two cases, the first of which was due to alcoholic excesses and was almost identical with the cases reported by Fischer mentioned above. The second case was not due to alcoholic excess, and differed in many respects from the first case, although it presented a combination of weakness, ataxia, and disturbances of sensation. From a consideration of his cases Dr. Löwenfeld regarded the lesion as being situated in the spinal cord. In an appendix to his article, however, written after he had read Déjerine's article, he is led to consider that the symptoms in his first case depended on a disease of the peripheral nerves, while he continued to regard his second case as due to a disease of the spinal cord.

In February, 1884, J. Déjerine² published two cases similar to the first two of Fischer's, although there was less muscular atrophy and paralysis, and the first one of Löwenfeld's. Both cases terminated fatally, and at the autopsy a neuritis of the peripheral nerve was discovered with integrity of the nerve-roots, the spinal ganglion, and the spinal cord. By Déjerine these cases are considered as a variety of locomotor ataxia.

In Sept. 1884, Dr. Krüche³ published an article on the pseudo-tabes of drunkards, and pointed out the great similarity of this form of disease to locomotor ataxia. He bases his remarks on seventeen patients that he had had in his asylum, and he points out that in the false locomotor ataxia of drunkards there is great hyperæsthesia to the electric brush, and the girdle sensation is absent. On an ophthalmoscopic examination of these cases he found in three cases the papilla white and in nine cases a venous fulness of the retina.

Indeed in 1884 the literature of this disease is quite abundant, for in addition to that above given Drs. Moeli⁴ and Dreschfield⁵ have each published cases of alcoholic paralysis in which degenerative processes were

¹ Archiv f. Psychiatrie u. Nervenkrankheiten, vol. xv. p. 438.

² Archiv. de Physiologie norm. et pathol., No. 2, 1884, p. 231.

³ Deutsche Medicinal Zeitung, Sept. 8, 1884.

⁴ Charité Annalen, 1884, and Berl. Klin. Wochenschrift, No. 14, 1884.

⁵ Brain, July, 1884.

found in the peripheral nerves, and Charcot¹ and Féré² have each published reviews of the disease; and in the *Lancet* of August, 1884 (American reprint), is an editorial on alcoholic paralysis. Charcot and Féré state that the muscles of the face are never involved.

From the considerable number of cases which have been reported we are justified in regarding alcoholic paralysis as a special form of disease with the following symptoms: After a number of cerebral and gastric disturbances due to the alcoholic poisoning the symptoms of the disease proper commence with neuralgic pains and paræsthesiæ in the legs, which gradually extend to the upper extremity, and which are accompanied at first by hyperæsthesia, later by anæsthesia, and in severe cases by retardation of the conduction of pain. Along with these symptoms appears a muscular weakness, which steadily increases to an extreme degree of paralysis, and is accompanied by rapid atrophy and by great sensitiveness of the muscles to pressure and to passive motion. Both the sensory and the motor disturbances are symmetrically distributed, and the paralysis attacks especially the extensor muscles. In addition to these motor and sensory symptoms there is also a decided degree of ataxia. The tendon reflexes are abolished, and vaso-motor symptoms, such as œdema, congestion, etc., are usually present. Symptoms of mental disturbance are always present in the form of loss of memory, and in transient delirium.

These symptoms, with the exception of the mental derangement, and perhaps the ataxia also, are very similar to those of multiple neuritis not dependent upon alcoholic poisoning.

In regard to the lesion associated with these symptoms, the spinal cord has been found entirely normal in all the cases in which a post-mortem examination has been made. On the other hand, during the past four years, degenerative processes have been found in the peripheral nerves in a number of cases of alcoholic paralysis. Lancereaux has reported three cases in which such changes were found, Déjerine and Moeli have each reported two such cases, and Dreschfeld one; eight cases in all.

It therefore seems altogether probable that drunkards are especially subject to multiple neuritis, and that alcoholic paralysis is simply multiple neuritis complicated by other symptoms of alcoholic poisoning, such as mental derangement, tremor, and ataxia. These latter symptoms seem to be due to changes in the cerebral cortex, for in the second case reported in this article there was found a degeneration and atrophy of the nerve-cells in the cerebral cortex, a congestion of the pia mater, and an effusion of serum in the sub-arachnoid space. Very little attention appears to have been given to the study of the pathological histology of the cerebral cortex,

¹ Gazette des Hôpitaux, Aug. 28, 1884.

² Progrès Médical, June 14, 1884.

either in cases of alcoholic paralysis or in other forms of chronic alcoholism, but a degeneration of the nerve-cells in the cerebral cortex similar to that found in the second case has been described by Dr. Wilks¹ as occurring in cases of chronic alcoholism. An effusion of serum in the sub-arachnoid space, and a chronic congestion or inflammation of the pia mater are very commonly found in cases of chronic alcoholism.

The lesion, then, in alcoholic paralysis, is in all probability a degeneration of the peripheral nerve-fibres and of the nerve-cells in the cerebral cortex, together with a chronic congestion or inflammation of the pia mater. This lesion explains well the symptoms, although it is certainly curious that alcohol should not attack the spinal cord, but only the highest and the lowest part of the nervous system if one may so call the cortex of the brain and the terminal branches of the peripheral nerves.

ARTICLE V.

FISTULOUS COMMUNICATIONS BETWEEN THE INTESTINES AND THE FEMALE GENITAL CANAL. By H. D. FRY, M.D., of Washington, D. C.

SINCE the application of plastic surgery to gynecological operations the treatment of vesico-vaginal and recto-vaginal fistulæ is as well understood as are the etiology and symptomatology. The result, though, when contrasted with the old tedious plan of cauterization, is brilliant no less to the operator than to the unfortunate woman whose life is rendered miserable by such conditions.

The object of this communication, however, is to direct attention to less frequent forms of fistulæ that communicate with the genital canal, and to place on record a case of intestino-vaginal fistula. These fistulæ are of infrequent occurrence, because, as Petit has remarked, the conditions that give rise to the complication are rare, and because, I might add, when met with, they are of such grave character that death generally results before, or at any rate soon after, the development of the fistula. The reports of cases to be found in medical literature are, in consequence of this fatality, quite satisfactory as to cause, nature of the lesion, and parts involved, the information being usually obtained by post-mortem examination.

L. H. Petit has collected thirty-eight cases and published them, together with a review of the subject, in the *Annales de Gynécologie* for 1883.² Of this number the nature of the lesion was ascertained in all but three. The intestines and vagina were united by a fistulous tract twenty-three times, and the intestines and uterus thirteen. In one of the uterine

¹ Journal of Mental Sciences, 1864.

² I regret that I have not been able to consult the original article.

cases the intestinal opening could not be located, and in two of the intestino-vaginal fistulæ communications also existed with the bladder.

Among the causes giving rise to these lesions may be enumerated cancer, pelvic cellulitis and abscess, difficult labor, and affections of the intestinal canal, as obstruction, strangulation, intussusception, typhlitis, and perityphlitic abscess. Less often it may result from extra-uterine pregnancy, hyo- and pyo-salpinx.

Cancerous ulcerations may extend from the uterus or vagina directly to the large or small intestines, or more indirectly by invading intervening structures and bands of adhesive lymph produced by accompanying peritonitis. The late Marion Sims, with his extensive experience in uterine diseases, had met with but two cases of fistulous communication between the fundus uteri and rectum resulting from this cause, up to the time he published his article on "The Treatment of Epithelioma of the Cervix Uteri," in 1879. (*Am. Journ. Obstet.*, vol. xii. No. iii. p. 475.)

C. H. Moore reported in the *Lancet* (1864, ii. p. 428) a case treated unsuccessfully for diarrhœa, which, on post-mortem examination, was found to have a communication between the vagina and the small intestine as high as the jejunum. "Cancerous disease had traversed the adhesions, and by ulceration made an opening from the vagina into the bowel."

Pelvic abscess may occasion the lesion, the pus opening into the alimentary and genital canals. Fritsch (*Diseases of Women*, N. Y. 1883, p. 283) offers the following explanation of the manner in which the intestinal perforation occurs in such cases:—

"The inflamed, paralytic portion of the intestine depends into the abscess cavity. Some feces remain behind in the dependent portion. The after-coming fecal masses force that portion more and more outward, *i. e.*, into the abscess, solution of continuity occurs, and the old fecal fragments drop into the abscess cavity. Thereby the contents become ichorous, fever ensues, the wall of the abscess becomes inflamed, and perforation outward or into an adjoining organ follows; gas, fetid pus, and a few old fecal fragments are evacuated."

Difficult labor acts as a cause in several ways. The lesion may follow quickly after parturition, as, for instance, a rupture of the genital canal would allow the escape of a loop of intestine through the rent, and its subsequent sloughing would form a fistula. Secondly, and more remotely, it may be produced by the occurrence of a puerperal cellulitis, abscess, and perforation in both directions as mentioned above. M. Demarquay gives an example of the lesion following shortly after labor. (*Gaz. Méd. de Paris*, 1867, xxii. p. 341.) A long and tedious labor was ended by forceps extraction. After the fifth day, fecal matter began to pass from the vagina, and was very much increased in amount about three hours after eating. Examination showed that the discharge came through the os uteri, and by passing the finger into the cavity of the womb the fistula could be felt upon the anterior face of the uterus at the union of the body with the neck.

A case due to cellulitis soon after confinement, and illustrating the amount of suppuration that may take place, is reported by George Cursham, M.D., in the *London Medical Gazette* (1834, xiii. p. 943). The woman died with symptoms indicative of a pelvic abscess, and had a puriform discharge from her vagina. Post-mortem examination revealed a large cavity in the right iliac fossa filled with putrid matter and coagulated blood. The psoas and iliac muscles were almost entirely destroyed; the abscess had followed the course of the former muscle and burrowed into the thigh. Parts of the pelvic bone were denuded, and a portion of the capsular ligament of the hip-joint was also destroyed. The intestine was ulcerated and formed a free communication with the abscess, so that feculent matter had passed into the cavity. The abscess extended into the cavity of the pelvis by the side of the uterus, and a communication was formed between it and the abscess by means of a small opening a little above the cervix. The arteries, veins, and nerves passing to the anterior part of the thigh were contained in the abscess, and the femoral and iliac veins were obliterated by firm coagula.

Fistulous lesions due to intestinal affections follow the symptoms of the antecedent disease.

The following being one of the inexplicable cases, I feel warranted in giving the history more in detail than would otherwise be necessary.

Mrs. A. E. B., white, twenty-eight years of age, was born in Pennsylvania. With the exception of an attack of typhoid fever in 1874, she has always enjoyed excellent health. Married when eighteen years old, but has never been pregnant. Menstruation began when fourteen, was regular and painless until the fall of 1879.

In September, 1878, she was taken with the first of a series of attacks, which recurred every few months. They consisted of pain in the bowels and of nausea, accompanied by constipation. She was treated for neuralgia of the womb. At the end of twelve months her catamenia failed to appear, and from that time the attacks became more frequent and violent.

Two months later (November, 1879) her abdomen commenced to swell, and she noticed a "fluttering" in her left side. Was also greatly annoyed by frequent and painful micturition. These symptoms gave rise to a diagnosis of pregnancy (extra-uterine?) by her attending physician. Having continued to grow worse, she was obliged to keep her bed for two or three weeks. Had constant vomiting and severe abdominal pain, with constipation, in spite of purgatives by mouth and injections by rectum. Success after several weeks brought a discharge of feculent matter, and with it the relief of pain and vomiting. During the succeeding winter she had nausea at times, and some abdominal pain with diarrhoea and constipation alternating.

In April, 1880, her menses returned in profuse amount, after seven months' absence, and her attending physician thought premature labor threatened. Her abdomen returned to its natural size. It had continued to enlarge during those months, and was then as prominent as it should have been at a corresponding stage of pregnancy.

In June her physician left the city for several weeks, and anticipating her *accouchement* at an early day, advised that she should call in a certain

physician living near by in case the event came off in his absence. She, it may be stated, had all along questioned the opinion of pregnancy. In a few days she was seized with cramps in her abdomen of more than usual severity, and called in the other doctor. That gentleman expressed doubt concerning the existence of pregnancy, and administered an anodyne, which relieved her in a few days.

During the next year she avoided medical advice, and managed to attend her household duties, although far from well. Abdominal pain and bearing-down sensations were complained of, the "fluttering" was felt in the left side, and exercise produced pain on that side, with a numbness down the corresponding limb.

Nothing noteworthy occurred until Thursday, June 9th, 1881, when a constipated condition of the bowels, which had lasted five days, was followed by a severe attack of cramps. Anodynes seemed powerless to relieve her of the agony. Calomel and opium were administered on Friday, Saturday, and Sunday. Sunday and Sunday night frequent rectal injections of soap and water were given, but all without accomplishing their purpose. Monday she commenced to vomit stercoraceous matter, and about every half hour a washbasinful of thin fluid matter was ejected,¹ dark green in color, containing some lumps, and having a very offensive odor. Pain was relieved when the vomiting began. In the evening a consulting physician was called in. A blister was applied to the epigastrium, flaxseed poultices put over the abdomen, the calomel given without opium, and a solution of carbolie acid ordered internally. Having had no nourishment since the beginning of the attack, enemata of beef-tea were given. Monday night she did not vomit so often. Tuesday vomited stercoraceous matter four or five times, but of less amount and more fluid character. At 6 P. M. of that day she felt slightly better, and small quantities of beef-tea and chicken broth were taken by mouth. Wednesday, 7 A. M., she had a small stool of dark and well-formed pieces of feces, and during the day two or three more movements were passed. Vomiting ceased; improved slowly the next few days; bowels acted, but the abdominal pain did not entirely leave.

The following Monday (20th), the pain increased, and each paroxysm was accompanied by gurgling, while, at the same time, the peristaltic motion of the intestines was plainly visible, causing the abdominal wall to rise and fall with a vermicular-like movement. During that and the first half of the succeeding week, the pain, the gurgling, and visible peristaltic movement of the intestines kept up. She had a stool nearly every day; it was painful, accompanied by tenesmus, and contained blood and mucus.

August 1st she suffered an aggravation of the pain, and her attending physician being absent from the city I was called to see the case. Intending only to temporize, and without obtaining a history of her illness, I gave a hypodermic injection of morphia, directed hot flaxseed poultices to be applied over the abdomen, and left an opiate to be taken by mouth. She was relieved for the time, but on the night of the 3d I was again sent for, and asked to take charge of the case, owing to the continued absence

¹ I would be loth to accept this statement without due allowance for exaggeration if I had not before witnessed the enormous quantities of intestinal fluid and bilious matters that may be vomited in cases of obstruction of the small intestine. The patient and her husband are very intelligent persons, and remember the details of her sickness so well that I have had little difficulty in obtaining this history.

of her former physician. Pain, gurgling, and stercoraceous vomiting had set in. When I arrived she was in the act of vomiting liquid feces of a most disagreeable odor. There were pain, gurgling, tenesmus, and bloody and mucous stools. Examination *per rectum* revealed therein the presence of invaginated bowel. The patient was placed in the genu-pectoral position, and about two quarts of tepid water were injected into the bowel. She was kept in that position about five minutes, when pain and the urgent desire to expel the fluid made it necessary for her to use the chamber. The clyster was forcibly returned discolored with feculent matter. The finger passed into the rectum then failed to reach any intussuscepted bowel. Much relief was experienced, and a hypodermic injection of morphia gave an uninterrupted sleep for the rest of the night. For one week following large rectal injections of tepid water were given, morning and night, with the patient in knee-chest position. She also had natural movements from the bowels daily. Pain was relieved; the visible peristalsis had disappeared, and the gurgling tenesmus and dysenteric stools were absent. She was very much emaciated, but improved sufficiently to leave the city on the 15th of September for a visit to Pennsylvania. During the month of August, and up to the time of leaving Washington in September, the large enemata had been administered at irregular intervals. She had had nausea and occasional attacks of vomiting, and twice the contents of the ejected matter were stercoraceous. Pain and borborygmus had come on at intervals, but the dysenteric symptoms were relieved. Liquid diet only had been allowed. Opium and bismuth had been administered when necessary. Purgatives were avoided.

The patient remained away one month, and was greatly improved. Until her next attack of sickness she had a good appetite and digestion, no nausea, and had regular actions from the bowels. Her complaints were irregular and scanty menstruation, bearing-down sensations, and pain in the left side and corresponding limb increased by exercise. Examination revealed the uterus in its normal position.

In June, 1882, she had an attack that resembled pelvic cellulitis of the left side, which confined her to bed one month.

August 6th her troubled existence was further made miserable by a return of the old symptoms of intestinal obstruction. The rectal injections were repeated, and for a time were administered through a long rectal bougie. Examination *per vaginam* detected for the first time the presence of a fluctuating tumor about as large as a hen's egg. It was situated on the left side of, and separate from, the uterus. In addition to the pain and vomiting she had frequent desires to urinate, associated with straining efforts. These symptoms kept up with varying degrees of intensity, and the tumor increased sensibly in size until at the time I left the city, in September, for several weeks' vacation, it had attained the dimensions of an ordinary sized orange. When I returned the patient had left home for a trip, and I saw nothing further of the case until January, 1883. She then called at my office, and I learned that she had remained away one month; that the abdominal pains and bladder irritation had continued to trouble her until, in the latter part of December, while walking the floor in a paroxysm of pain, she suddenly felt something break. The sensation was accompanied by a discharge from the vagina of about a pint of pus and blood having an intensely foul odor. For a time she was relieved of pain and irritation of the bladder, but they occasionally returned in lesser degrees, and she has since then been subject to slight vaginal discharge.

I made an appointment to call and examine her for the purpose of ascertaining whether the tumor had disappeared, but, in the mean time, was summoned to her house on account of a severe attack of pain. The finger introduced into the vagina revealed a bagging of the mucous membrane in front of the cervix, and some swelling, but no well-defined tumor, to the left of the uterus. A teat-like protuberance was situated on the anterior wall of the vagina, in the median line and about three-quarters of an inch below its junction with the cervix. A speculum was introduced, and by further examination the apex of the projection was found to be perforated by an opening just large enough to admit a small probe. The next day, with the assistance of Dr. J. A. Tarkington, the patient was placed in Sims's position, and I enlarged the opening with a probe-pointed bistoury. Some discharge followed, with nothing peculiar to attract my attention, except its disagreeable odor. The following day I found the patient comfortable. She had had considerable discharge during the night, and the cloths taken from her presented the peculiar yellow discoloration of bile. I passed a No. 10 gum catheter into the opening, and the discharge that ran through it could not have startled me more had I tapped her gall-bladder. *It looked like pure yellow bile.* One quart of warm carbolized water was injected through the tube (allowing it to run out as it was thrown in), with the effect of being returned discolored yellow, and at times dark muddy, and containing shreds of tissue and pieces of feculent matter. The odor was intensely disagreeable and feculent. These injections were repeated daily for two or three weeks, then every other day for several months, and finally the intervals were increased to three or four days. The catheter when pushed through the vaginal opening could be made, without effort, to penetrate ten or twelve inches within the fistula. She was made comfortable, and suffered no further pain except once in September, when I allowed seven days to elapse before washing out the cavity. The returning fluid always brought feculent matter, with sometimes a more disagreeable odor than at others. At each menstrual epoch for some months succeeding the opening of the fistula the discharge would increase in quantity and assume very irritating qualities. It would become more bilious and acrid at such times, irritating the vagina and external parts and causing them to swell and burn. The only relief she could procure was by frequent vaginal injections of hot soothing liquids. This seldom occurred except at menstrual periods which were accompanied by scant flow of blood. Often the discharge through the fistula was observed to be increased about an hour after a meal, and it was particularly apt to be of the acrid, bilious character if any greasy food had been partaken of. At some washings particles of food would be brought away, such as pieces of meat, and the yellow of hard-boiled egg. The seeds of fruit and tomatoes, and the pulp tissue of orange, were often recognized. In fact I could generally give a tolerably accurate description of the bill of fare which had constituted the previous meal by means of the contents of the water returned by injection. Occasionally such refuse would accumulate in sufficient quantity to dam back the flow through the fistula, and cause pain until relieved by an injection. During these washings she often declared that she could feel the water run up into her bowels on the left side, and it is a significant fact that frequently afterwards she would feel a desire to have a movement, and on sitting upon the chamber would pass a thin fluid stool.

Her general health improved very much, her appetite became good, bowels regular; she had no abdominal pain, and no further trouble with the left side or leg.

The amount of discharge through the fistula has been gradually lessening, until at present I do not wash it out but once in three or four weeks. Also, much less solid débris is passed. For these reasons I am encouraged to believe that the proximal opening of the fistula is undergoing a gradual cicatricial contraction.

Her health is good, and she attends altogether to her own marketing and household affairs, and, in fact, is comparatively little inconvenienced by her trouble.

Remarks.—I have stated my inability to unravel this pathological knot, and the several views that occur to my mind are merely conjectural explanations that have no proof to sustain them. In fact, I can scarcely see how anything short of a post-mortem examination would have revealed the sequence of pathological events. More particularly is this true of that period of ill health preceding the intestinal obstruction that occurred in June, 1881—a period of several years that was marked by nausea, abdominal pains, and enlargement, suppression, and, later, irregular menstruation, and bearing-down sensations. The cause, nature, and situation of the obstruction are equally involved in obscurity; its relief was followed by pain, gurgling, and visible peristaltic movement of the intestines, symptoms indicating that the calibre of the gut was not restored. Two months later the condition culminated in well-marked intussusception.

The character of the discharge through the fistula, and its increase as soon as one hour after eating, indicate that the intestinal perforation is situated in the small intestine. It is evident that the tissues of the bowel at that point were so much impaired by the lesion causing the obstruction and intussusception, or by the intussusception itself, that perforation occurred, and the contents of the alimentary canal escaped. It is probable that a local peritonitis caused adhesions to form between the visceral and parietal peritoneum at the site of the perforation, and prevented the escape of feculent matter into the peritoneal cavity. The sinus then burrowed its way in the intermuscular cellular tissue, most likely in the region of the psoas, and finally reached the left iliac fossa. It will be remembered that the reduction of the invaginated bowel only relieved the immediate dangers. For ten months afterwards she suffered pains in the left side and limb, and bearing-down sensations, increased by exercise. That period would correspond to the time when the sinus was making its way down to its vaginal termination. Pelvic cellulitis, abscess, and rupture into the vagina would complete the conjectural picture of the formation of the fistula.

The diagnosis of intestino-genital fistulæ is made by an examination of the discharges passed *per vaginam*. Sometimes the condition is not sus-

pected until after death, owing to the infrequent occurrence of such lesions, and to the severity of the accompanying symptoms directing attention to other parts. A case has already been mentioned that was treated for diarrhœa, and the fistula was unexpectedly discovered at the post-mortem examination. Dr. T. G. Thomas, of Charleston, reports a case that was thought to be one of tubercular ulceration of the intestines. (*Charleston Med. Journ.*, 1854, viii. 639.) The treatment had little influence over the disease; she became very much emaciated, and died three months from the beginning of the attack. During the last month of her life she had a profuse leucorrhœa; the discharge was thick, purulent, and offensive. The appearance of the discharge was like ordinary leucorrhœa, and presented nothing calculated to arouse suspicion of fistulous opening except possibly the smell.

Autopsy revealed . . . "a membranous band, apparently a part of the right lateral ligament, extending from the caput coli to the upper part of the vagina, which, upon raising the parts, was sundered, and discharged a clot of coagulated blood. Uterus free from disease; cavity enlarged, and tissue relaxed and pale. Near the junction of the vagina with the uterus there existed a fistulous orifice, connected with the band above mentioned, and through which a probe could be passed with much ease into the cæcum. The cæcum was filled with blood, as was also the ileum, for some distance along its extent; near the junction of the appendix vermiformis with the cæcum there appeared an orifice similar to that in the vagina, except being of larger size, and similarly related to the communicating canal. Neither dysenteric ulcerations nor tubercular deposits were discovered in any part of the intestines."

Dr. Thomas concluded that the diarrhœa was caused by the opening of an abscess of the uterine appendages into the colon, and that the leucorrhœa came from a similar perforation and discharge into the vagina.

The prognosis of these fistulæ is very grave, particularly of the uterine variety. Death is due, in the majority of cases, to the accompanying disease, while in some it is the result of chronic suppuration, of pyæmia, septicæmia, or exhaustion. The affection terminates favorably in a considerable number of cases. Petit quotes a case that was cured by the woman becoming pregnant and giving birth to a full-term child. A. T. Einbeck, M.D., reported a case of spontaneous cure in a child twelve years of age. (*St. Louis Cour. Med.*, 1880, iv. 122.) Pills taken by the mouth, and feculent matter, were passed *per vaginam*. Very little can be done in the way of treatment except to palliate suffering. Caustics may be useful in some cases. Laparotomy and closure of the intestinal opening by suture may be a proper procedure in cases demanding it.

ARTICLE VI.

LARYNGEAL HEMORRHAGE. By J. W. GLEITSMANN, M.D., Surgeon to the German Dispensary, and Assistant to the New York Polyclinic, Throat and Ear Department, New York.

THE name laryngeal hemorrhage is used for a variety of affections which differ widely in regard to cause, nature of the disease, and severity of the symptoms, and have in common only the effusion of blood into some part of the larynx. Investigation will be facilitated by first ascertaining whether the effusion took place on the free surface of the mucous membrane, or into the submucous tissue. Submucous hemorrhages are often grave in character, and in the majority of cases due to some extrinsic cause, trauma, for instance. Surface bleeding arises from a number of causes, of which we may mention foreign bodies, ulcerations subsequent to syphilis, cancer, hæmophilia, further catarrhal conditions, and sometimes from no assignable cause. The name, laryngitis hæmorrhagica, is generally applied on the continent to hemorrhages into the interior of the larynx, which do not originate from any lesion, but are considered an independent malady, generally connected with catarrhal laryngitis. Although it cannot be denied that the extravasation of blood is in many instances a symptom, however rare, of an existing cause, there are undoubtedly cases in which hemorrhages occur without previous disease. Inasmuch as the term laryngeal hemorrhage is applicable to such a variety of different conditions, it seems advisable, in the opinion of the writer, to retain the name laryngitis hæmorrhagica, and to designate by it those effusions of blood on the free surface, or under the epithelium of the mucous membrane, which are of a so-called idiopathic character, and not due to any constitutional disease or traumatic origin.

A case of this nature recently came under my observation. Patient, male, 25 years of age, gave the following history: His sickness began with hoarseness, which gradually increased within one week to complete aphonia, lasting two days. At the same time dyspnoea set in, which was greater in the morning and evening than during the rest of the day. Four days later, November 23, 1884, thirteen days after the onset, he expectorated blood the first time when walking home to dinner. No unusual exertion or excitement preceded the bleeding, which this time, as well as later, occurred without previous cough, and, with but one exception, at the same hour. The quantity of blood lost was always small, and amounted to about half a teaspoonful. After the second hemorrhage the next day, he sought medical aid.

Patient is a short-set, robust man, of fair intelligence, with muscles well developed, and very little superfluous adipose tissue. He appears to be about five feet seven inches high, weighs 160 pounds, and has a good family record. Five years ago he suffered from malaria for eight months at his home (Galizia), but otherwise was always well. He came to New York City in 1882, and is at present making button-holes. His workshop is well ventilated; his residence, aside from tenement life, healthy.

Physical examination of the chest and other organs revealed nothing abnormal. The laryngoscopical mirror showed symptoms of intense catarrh, reddish-gray discoloration of the vocal cords, and general congestion and turgescence of the mucous membrane, especially of the ventricular bands, which thereby greatly interfered with inspection of the cords. At the junction of the anterior and middle third of the left band was a bleeding spot of the size of a pin's head, from which the blood could be seen oozing after being mopped up with the cotton carrier. Dark coagula were visible along the whole free border, and also below the left cord.

The following day his dyspnœa increased, but he had not expectorated blood since the previous day. The greater part of both ventricular bands was covered with crusts of coagulated blood, which were firmly adherent, and both cords presented the same appearance as the left one did the day before. This picture was the acme of the disease, and henceforth his symptoms became less aggravating. After another slight hemorrhage the next day, only the posterior surface of the epiglottis and the anterior part of the ventricular bands were covered with coagula. He spit blood twice more on the two following days, the last time on the sixth day after the first attack. The dyspnœa and congestion of the mucous membrane gradually decreased, and when he ceased attendance on the tenth day, December 2d, his voice was better, his breathing free, and his general condition good. As there were at no time any threatening symptoms present, the treatment consisted simply in resolvent inhalations and topical applications of perchloride of iron and nitrate of silver alternately. When seen eight weeks later, he was as well and hearty as ever.

From the description it will be seen that this case ranks amongst those of laryngitis hæmorrhagica, as defined above. The literature, as far as accessible to the writer, is not so scant as it is generally supposed, and would assume considerable proportions if all cases observed were published. Semeleder¹ was the first to speak of dark-red vocal cords and a fresh coagulum on the anterior third of the right ventricular band in a man who the day before had violent vomiting after too hearty a meal, and streaks of blood in his expectoration. Another man with the same symptom persisting for three weeks had a small coagulum on the left band.

Lewin's² patient had croupy cough, and great dyspnœa at intervals. A bloody effusion extended over both vocal cords. A similar condition was present in a lady patient, who also spit blood. Lewin,³ besides, relates a case which, although not properly belonging to this chapter, is interesting enough to be briefly stated. An American medical student, previously accustomed to vigorous outdoor exercise, devoted himself ardently to his studies. He acquired a cold, followed by tickling in the pharynx, and repeatedly coughed up small quantities of blood. The lungs were declared intact by another physician, but Lewin found the anterior tracheal wall way down covered with bloody mucus, and saw how a small stream of blood appeared at times on the posterior part of the larynx, gradually ex-

¹ Semeleder, F., *die Laryngoscopie*, Wien, Braumueller, 1863, p. 33.

² Lewin, J., *die Inhalationstherapie*, II. edition, Berlin, Hirschwald, 1865, p. 328.

³ Lewin, I. c. p. 310.

tending to the upper part of the interarytenoid space. He concluded that the source of the bleeding was in the bronchi, and expressed his fear that it was the forerunner of constitutional disease. A few months later the patient had a severer hemorrhage, and symptoms of incipient phthisis developed.

Navratil's¹ case occurred in winter, when suddenly very cold weather set in. A dark-brown layer covered the cords, which, after removal of the extravasated blood, appeared red and turgescient. Several local applications made it finally disappear.

Mandl² saw effusion of blood from the *ventriculi Morgagni* in an aged lady. Tobold³ mentions spontaneous bleeding on the border of the epiglottis and surface of the cords in a healthy man, and a bleeding vessel on the right cord in a delicate government clerk, both patients being subject to preceding catarrhal laryngitis. Concentrated solution of alum was the treatment adopted.

Fraenkel's⁴ case is the most instructive one on account of the quantity of blood lost, and of the duration of the disease. A woman in the last month of her fourth pregnancy, who had daily vomiting, but otherwise was healthy, complained of hoarseness and dyspnœa, and expectorated blood four days before seeking advice. The mucous membrane of the larynx was considerably swollen, especially on the posterior wall; it was of deep-red color, the vocal cords of blackish redness. Small dark tumors adhered to the cords and were seen below them, hiding the trachea from view. The distress of breathing ceased as soon as small dark blood-crusts were expectorated, and then parenchymatous bleeding from the cords and posterior wall could distinctly be seen. Fraenkel had occasion to examine the patient during one of her attacks, changing from comparative ease to severe dyspnœa and relief, as soon as the crusts were coughed up. For several days these symptoms recurred every half hour, and four weeks after the first, the patient had the last hemorrhage. The amount of blood lost was once a half, and at another time a whole, cupful. After her confinement the bleeding stopped, but the catarrhal symptoms remained for some time later. It may be stated that the weather was extremely inclement during that season.

Boecker's⁵ patient presented similar features—catarrh, sanguineous discharge one week before examination, and the same appearance of the mucous membrane and cords. Dyspnœa was brought on only by forced inhalation; the hemorrhage yielded to treatment after several days.

¹ Navratil, E., *Laryngologische Beiträge*, Leipzig, Zechel, 1871, p. 18.

² Mandl, L., *Traité pratique des maladies du larynx*, Paris, Baillière, 1872, p. 644.

³ Tobold, A., *Laryngoscopie und Kehlkopfkrankheiten*, Berlin, Hirschwald, 1874, p. 142.

⁴ Fraenkel, B., *Berliner klinische Wochenschrift*, No. 2, 1874.

⁵ Boecker, A., *Berliner klinische Wochenschrift*, No. 15, 1874.

Boecker used inhalations of chloride of sodium, whilst Fraenkel applied nitrate of silver 1 to 15, and 1 to 30. A second case of Boecker—extravasation of blood into the mucous membrane after cauterization of an ulcer—cannot well be classified under our heading.

Hartmann¹ saw bleeding in a member of a singing society, who spit up blood of a florid color and two to three ounces in quantity after a rehearsal, and also the following morning. No unusual strain of the voice or catarrhal symptoms preceded the accident. The blood was oozing from a largely ruptured capillary vessel upon the upper surface about the middle of the left ventricular band, and, trickling down into the glottis, produced paroxysms of dyspnœa, cough, and expectoration. The application of a strong solution of ferric alum to the seat of the hemorrhage readily controlled the bleeding.

Wagner's² patient was a physician who had several profuse hemorrhages from the larynx within four months. When first examined he had general hyperæmia of the mucous membrane; the blood came from the left band and ventricle posteriorly. Repeated examinations of the chest gave negative results, and the doctor lived to become an active worker in the profession.

Mackenzie³ confines himself to saying that he met with a few cases, and that in these the congestion was slight, and that the hemorrhage almost always resulted from some violent expiratory effort, such as coughing or vomiting.

Smith's⁴ patient was an actor, who frequently spit blood in the course of fourteen months—less during the day, more during and after the exertion of the evening. The blood was seen coming from the right vocal cord near its attachment to the vocal process of the arytenoid cartilage. A solution of perchloride of iron proved effectual; but, as the patient would not give up his engagement, and as the exciting cause remained, treatment was abandoned.

Effusion of blood under the epithelium of the left cord in its whole length in a woman with pharyngo-laryngitis was seen by Schnitzler,⁵ who also observed extravasation in both cords in a girl with diphtheritic paralysis. He besides mentions hemorrhages of the left cords occurring in two lady singers after great vocal exertion, returning in the course of three years, and successfully relieved in two weeks by insufflations of acetate of lead and nitrate of silver.

¹ Hartmann, J. H., Transactions of the American Laryngological Association, 1879, p. 275.

² Wagner, Clinton, *ibid.* p. 279.

³ Mackenzie, Morell, Manual of Diseases of the Throat and Nose, vol. i. London, Churchill, 1880, p. 268.

⁴ Smith, A. H., Archives of Laryngology, vol. i., No. 1, 1880, p. 65.

⁵ Schnitzler, I., Wiener medizinische Presse, No. 38, 1880.

Bettman¹ describes the case of a widow, who, five days after exposure to a draught, spit at night half a teacupful of blood during a violent cough. The entire laryngeal and tracheal mucous membrane was deep red, the vocal cords hyperæmic, the ventricular bands thickened and almost livid in color. They were covered with fresh and dried blood, and showed two symmetrical bleeding spots on their lateral surfaces. After a similar second attack, an application of fused nitrate of silver and benzoin inhalations stopped the bleeding.

Schaeffer² observed sanguinolent expectoration and blood-crusts on the cords, below them, and also in the whole larynx in three female cooks, who, exposed to rapid changes of temperature, had intense laryngitis, with cough and dyspnœa. The fourth patient, a robust servant-girl, showed dried coagula, extending over the whole larynx down to the upper part of the trachea; she was cured within six days by internal administration of iodide of potassium, additional to insufflations of boracic acid and iodoform. Schaeffer ascribes the quicker result in the last case to the iodide of potassium. All four were from 24 to 30 years of age, and had cessation of menses during their sickness; the last one was attacked with the bleeding at the time she ought to have menstruated (vicarious menstruation).

Stepanow³ alludes to the case of a phthisical girl with bloody sputa, swelling of the bands, and coagula below the cords, and then gives the history of two patients, who, according to him, with those of Fraenkel, Boecker, and perhaps Lewin alone, can be called true cases of laryngitis hæmorrhagica. The first was that of a female hospital nurse, who caught a severe cold, became aphonic, and spit a tablespoonful of blood in bed on the third day. The bleeding was always of the same quantity, and occurred either daily or every other day. When examined on the tenth day the cords were pale red; dark, thick coagula were visible along the whole length of their lower surface, coalescent at the anterior angle. Pigments of nitrate of silver made the coagula disappear after four or five days, but several relapses occurred, one after applying electricity on account of diminished tension of the cords, another during a paroxysm of cough after topical treatment. After a little over three weeks the bleeding stopped, and two weeks later the catarrhal laryngitis also disappeared. The other patient Stepanow saw only once; she had similar symptoms, expectorated blood generally in the morning after a severe cough, and was sick over one month. It is not quite evident why Stepanow claims the name laryngitis hæmorrhagica for his two cases with those mentioned above, and quoted by him exclusively. He lays stress on the influence of sex (female), the longer duration of the disease, on the mild-

¹ Bettman, J., Chicago Medical Journal and Examiner, August, 1882.

² Schaeffer, M., Deutsche medicinische Wochenschrift, No. 2, 1883.

³ Stepanow, J. M., Monatschrift für Ohrenheilkunde, etc., No. 1, 1884.

ness of catarrhal symptoms in some instances, as in his own case, which, by the way, had hoarseness and aphonia before bleeding, and on the origin of the hemorrhage from the vocal cords.

If the term laryngitis hæmorrhagica has to be narrowed down to such limits, our synopsis of the literature will show that some cases even surpass Stepanow's observation, partly in duration, partly in quantity of blood expectorated, and therefore deserve the same title.

Ingalls¹ calls his case one of submucous infiltration of blood in the left vocal cord, but, as it resembles that of Schnitzler's so much, it is included here. The patient, a merchant, complained of sudden hoarseness and discomfort in the larynx one morning, and on examination the left cord was found of a brownish-red hue, about twice its normal size. Iodoform powder and cold compresses had considerably improved the color and size of the cord when seen two days later.

With a view of ascertaining to some degree the proportion of cases published to those observed, fifty-seven circular letters were addressed to laryngologists in different States. It was also deemed desirable to learn the opinion of the profession on the possible relationship between laryngeal hemorrhage and subsequent pulmonary phthisis. To these inquiries twenty-five answers were received, which are herewith thankfully acknowledged. Twelve observers had not met with cases, and of the remaining thirteen affirmative answers, eight gave special data. Two of these are recorded (Smith, Ingalls); the other six (Knight, of Boston, Seiler, Tauber, Lefferts, Morgan, Simrock) gave details of twenty-two cases of hemorrhages on the surface of the mucous membrane in different parts of the larynx, exclusive of those due to traumatic or dyscrasic agencies. Only three of these patients had subsequent phthisis, one six, another eight months after the laryngeal bleeding. The general tenor of the replies was, that hemorrhage from the larynx can be regarded as a precursor of phthisis in exceptional cases only. The data furnished further tend to sustain the assertion made in this paper, that many, if not the majority, of cases are not published, and that they are by no means so rare an occurrence as generally supposed.

Although not coming strictly within the scope of this article, there are laryngeal hemorrhages which are of sufficient interest to the laryngologist to deserve mention, and some of these will be briefly enumerated. Schroetter² and Schnitzler saw extravasation of blood in the larynx and trachea in morbus maculosis Werlhofii; and Rethi³ describes two similar cases, one of which he attributes to hæmophilia. Electricity seems to have been the cause of a relapse in Stepanow's case; and Schroetter saw

¹ Ingalls, E. F., *Journal of the American Medical Association*, No. 15, 1884.

² Schroetter, L., *Jahresbericht der Klinik für Laryngoscopie*. Wien, Braumüller, 1871, pp. 3 und 4.

³ Rethi, L., *Wiener medizinische Presse*, Nos. 36 und 37, 1884.

an effusion of blood on the cord under endolaryngeal application of the same agent. The latter also records the change of the left cord to an intensely red swelling after applying a two per cent. solution of nitrate of silver to the larynx of a gracile lady. Bettman (*l. c.*) writes of a gush of blood coming from a longitudinal cleft of a papillomatous excrescence on the posterior laryngeal wall in a man suspected of phthisis; and Schaeffer (*l. c.*) saw a blood coagulum covering a fissure of the mucous membrane of the incisura inter-arytenoidea in a girl with catarrhal laryngitis (cases of Stoerk's *fissura mucosa*, Virchow's *Archiv*, vol. ix. p. 274). Instances of hemorrhages brought on by foreign bodies or ulcers in the larynx are of no uncommon occurrence. Of the former, Gross¹ says: after swallowing foreign bodies, the patient throws up blood sometimes. The quantity is usually very small; now and then however it amounts to several ounces. (See also Hartman, *l. c.*) Gibb² had a lady patient afflicted with laryngitis from syphilitic dyscrasia. She spit blood of bright florid color three times on the day she was examined. There was no cough, but a breach of surface of very intensely red color in the mucous membrane above the left ventricle. Tuerk³ relates the death of a patient from an erosion of the *arteria lingualis*, caused by a large syphilitic ulcer at the right extremity of the hyoid bone.

Submucous hemorrhages into the larynx and the adjacent parts deserve the interest of the specialist as well as of the general practitioner the more, as they are liable to cause sudden death under symptoms of acute oedema glottidis. The proper use of the laryngoscope at the right time is of the utmost importance, and will go far to save the patient's life. The causes are manifold, and cannot well be schematized. Pfeufer⁴ lost a patient who had acquired severe stomatitis by excessive use of mercurial ointment, on account of parasites. On the third day after his reception into the hospital, symptoms of laryngeal stenosis set in, and he died from suffocation five hours afterwards. The post-mortem revealed a submucous effusion of blood of one square inch extension below the right ventricle. Ruehle⁵ remarks that similar effusions have been observed in scurvy, and Immermann⁶ says that the mucous membrane of the bronchi and larynx in this disease almost always shows extended and numerous ecchymoses,

¹ Gross, S. D., *A Practical Treatise on Foreign Bodies in the Air-Passages*. Philadelphia, Blanchard & Lea, 1854, p. 79.

² Gibb, Geo. D., *on Diseases of the Throat and Windpipe*. London, Churchill & Sons, 1864, p. 264.

³ Tuerk, L., *Klinik der Krankheiten des Kehlkopfs und der Luftröhre*. Wien, Braumüller, 1866, p. 402.

⁴ Pfeufer, L., *Larynxapoplexie*, *Zeitschrift für rationelle Medizin*, III. Band, 1845. p. 143 (not neue Folge III. Band, as generally erroneously quoted).

⁵ Ruehle, H., *die Kehlkopfkrankheiten*, Berlin, Hirschwald, 1861, p. 172.

⁶ Immermann, H., in *Ziemssen's Handbuch der speciellen Pathologie und Therapie*, Leipzig, Vogel, 1876, Band XIII. part 2, p. 608.

and is covered with bloody mucus. Poisoning with phosphorus produces like conditions, according to Gottstein.¹

Bogros² relates two cases of hemorrhagic variola with exitus letalis, both of which had sanguineous infiltration of the ary-epiglottic folds. In one of them they attained the thickness of two centimetres, and completely occluded the *anitus laryngis*. The glosso-epiglottic folds presented the same aspect, and interfered thereby with the mobility of the epiglottis. Suicidal attempts also contribute their share to this subject. Probably the oldest two on record are by Bobillier.³ A workman cut himself with a razor, and inflicted a horizontal wound about six centimetres long between the hyoid bone and the thyroid cartilage. After it was dressed he felt well till the fifth day, when symptoms of laryngeal stenosis appeared, to which the patient succumbed. The post-mortem showed severance of the upper and anterior part of the thyroid cartilage and of the hyo-thyroid membrane, bloody infiltration of the right ary-epiglottic fold, and œdema of the laryngeal aperture. The second patient was a soldier who set a triangular wound of an inch and a half in length on the right side of the throat, which did not bleed until after four hours. A tampon stopped the bleeding towards the surface, but a soft bluish tumor formed on the left lower maxilla, and although the bandage was removed again, the patient died from suffocation. Dissection showed that the wound did not penetrate into the larynx, but that the entire cellular tissue of the anterior part of the throat was filled with blood, and the infiltration of the mucous membrane of the arytenoid cartilage was so great that the entrance to the larynx was obstructed. Another case belonging to this category is described by Otto⁴ under the title: *Hæmatoma of the Aryepiglottic Fold*. It occurred in an insane man who cut himself in the throat with a pocket-knife, which wound was followed by a brisk hemorrhage on the outside only. Feeling otherwise perfectly well, 17 hours later severe stridor suddenly set in, the patient rose in bed, and before the bandage could be loosened died within three minutes. At the post-mortem no injury of the larynx was found, but, after being taken out, two large black-red tumors appeared lying over the entrance to the larynx, representing the enormously swollen ary-epiglottic folds. The description and two good drawings show that these tumors commenced on both sides of the base of the tongue, growing thicker when forming the glosso-epiglottic folds, and extending downward to the posterior surface of the arytenoid cartilages. The right tumor was three centimetres thick and covered the upper part of the cricoid cartilage, whilst

¹ Gottstein, J., *Krankheiten des Kehlkolpfs*, etc., Wien, Toeplitz und Deutike, 1884.

² Bogros, M., *Bulletin de la Société anatomique de Paris*, 1847, p. 141; also in Sestier's *Traité de l'angine laryngée œdémateuse*, Paris, 1852, pp. 63 and 114.

³ Bobillier, M., *Recueil de memoirs de médecine, de chirurgie et de pharmacie militaire*, tom. viii. 1820, pp. 140, 143; also in Sestier l. c. pp. 137, 138.

⁴ Otto, A., *Deutsches Archiv für klinische Medizin*, vol. xxvii. 1880, p. 580.

the left one had a thickness of two centimetres. Each one had an extension up and downwards; the latter was visible only after dissecting and drawing apart of the larynx. The left branch was smaller, and ended one centimetre above the ventricle; the right embraced the whole length of the right ventricular band, and ended in the ventricle, thereby completely occluding the cavum laryngis, when the latter was adjusted again. The remarkable feature of the case was that each of the two blood tumors was separate, and had no communication with the other. Of this fact Otto acknowledges himself unable to give a satisfactory explanation.

Lefferts¹ had a girl under treatment who carried a hat-block in her arms; in falling the block was caught between the right side of the neck and the curbstone. During night the respiration became labored, and next morning the right aryepiglottic fold was seen filled and enormously distended by effused blood, giving it a dark bluish-red appearance. The blood became readily absorbed, and after a few days all signs of the previous condition had disappeared.

Sommerbrodt² saw darkened suggillations in both cords, and a large one in the right ventricular band in a pregnant woman with acute laryngitis. He further gives the history of a girl who had the sensation of something sticking in her throat two hours after eating. The laryngoscope showed a black round mass of cherry stone size in the middle part of the posterior laryngeal wall. It was soft to the touch of the probe, and when lanced proved to be a submucous effusion of blood in the inter-arytenoid region. The same author³ relates as a curiosity a case of hemorrhage into an unusually large cyst of the epiglottis after its puncture.

These examples of submucous hemorrhages, to which more could be readily added, may serve to illustrate sufficiently their difference in cause, character, and symptoms from hemorrhages on the free surface, and to show the propriety of giving the latter a distinctive name when not arising from some extrinsic cause.

ARTICLE VII.

THE MEASUREMENT OF REFRACTION BY THE SHADOW-TEST, OR RETINOSCOPY. By EDWARD JACKSON, A.M., M.D., of Philadelphia, Clinical Assistant in the Eye Department of the Philadelphia Polyclinic, and the Eye and Ear Department of the Pennsylvania Hospital.

TEN years ago Cuignet, of Lille, had described a form of this test, calling it *keratoscopie*; but his paper upon the subject seems to have made

¹ Lefferts, G. W., New York Medical Journal, vol. xxvi., August, 1877, p. 207.

² Sommerbrodt, J., Berliner klinische Wochenschrift, No. 13, 1878.

³ Same, Breslauer ärztliche Zeitschrift, 1881, pp. 109-111.

no change in the methods of practical ophthalmologists. In 1878, however, his pupil, Dr. Mengin, introduced the practice of the method at Galezowski's clinic, in Paris. Here it was taken up by Dr. Parent, who demonstrated its optical basis, described a method of using it, and urged its advantages in a series of articles published in the *Recueil d'Ophthalmologie*, 1880. The name *keratoscopy* was given on the supposition that the play of light and shade, with which the test is specially concerned, was solely dependent on the form of the cornea. Parent, finding that this play was really due to the movement of an area of light on the pigment layer of the retina, called the method *retinoscopy*. In this he erred in giving a name equally applicable to other ophthalmoscopic examinations. The name best descriptive of the test is probably *fantoscopye retinienne*, proposed by Chibret.

Priestley Smith has called it the shadow-test, and Hartridge proposes *umbrascopy*. Both names are brief and distinctive; but retinoscopy has been so far sanctioned by use that, probably, it will not be replaced by any other term. Keratoscopy must be dropped. It is misleading, as is well illustrated by the reference to Charnley's paper, to be found in the *Index Medicus*, under the head of "Diseases of the Cornea."

In 1881, Parent spent some time at the Royal London Ophthalmic Hospital, and introduced the test there. It had already been noticed by Forbes (*Roy. Lond. Oph. Hosp. Rep.*, 1880, p. 62); but only after the visit of Parent did English ophthalmologists take it up with apparent enthusiasm; Charnley giving a description of it, and the fullest demonstration of its optical basis, in the *Royal London Ophthalmic Hospital Reports* (1882, p. 344), Morton describing it in his work on Refraction, and Juler in the *Ophthalmic Review* (1882, p. 327), and in the *British Medical Journal* (1882, ii. p. 670). Since then a considerable number of ophthalmic surgeons resident in London, or more or less intimately connected with the professional life of that metropolis, have written to urge the advantages of the shadow-test; and it has taken a prominent place in the text-books emanating from this medical centre. See those by Morton, Hartridge, Juler, Swanzy, and the late editions of MacNamara and others. The same thing might be said of Paris, and the literature emanating from its ophthalmologists and their intimate associates. But elsewhere this method of measuring refraction has scarcely been alluded to; and I have been able to find but a single brief and inadequate description of it that has been published on this side of the Atlantic. This neglect of the shadow-test is not without parallel. Other means of exact diagnosis, now generally employed, have made the same slow progress to professional favor. I am informed that it was not until about 1870 that ophthalmologists of this city began, habitually, to examine the fundus by the direct method. A description of the ophthalmoscope did not appear in this Journal until 1853, and then only as a quotation from an article

published in a foreign journal; and it was not until eight years later that there appeared in these pages the recorded results of an ophthalmoscopic examination made by an American surgeon. How strangely these instances contrast with the mushroom-like growth of a literature pertaining to therapeutic measures, such as the use of jequirity or cocaine!

With regard to the shadow-test, there is special reason for its slow adoption, in that the refraction of most eyes can be accurately measured by methods already in general use. Then its advocates have nearly all described its application with the concave mirror; a form of the test comparatively complex in theory and tedious in application, and, hence, offering the minimum of advantage from the maximum of effort spent in acquirement. The text-books and journal articles, above referred to, all describe this form of the test.

In 1882, Dr. Chibret published, in the *Annales d'Oculistique* (vol. xxxviii. p. 238), an article on the "Détermination Quantitative de la Myopie par la Keratoscopie (Fantoscopie Retinienne), à l'Aide d'un Simple Miroir Plan," which set forth the advantages of the shadow-test with the plane mirror, in determining the presence and degree of myopia in the examination of large numbers of recruits. In the *Ophthalmic Review* for August, 1883 (p. 228), appeared John B. Story's article on "The Advantages of the Plane Ophthalmoscopic Mirror in Retinoscopy." Story seems to have commenced to use the plane mirror before the appearance of Chibret's paper; but he failed to appreciate and embody in the method he described the greatest advantage of the shadow-test with the plane mirror, namely, the capacity to determine exactly the kind and amount of ametropia with but one or two changes of the lens placed before the patient's eye.

Finally, Priestley Smith has, in the *Ophthalmic Review* (1884, p. 266), described "A Simple Ophthalmoscope for the Shadow-test," and given some valuable hints as to the method of its use. Though the special form of the shadow-test developed below has, I believe, never before been described, suggestions of its essential features may be found in these three papers by Chibret, Story, and Smith.

Method of Examination.—The patient, with his accommodation at rest, is placed in the dark room, with the source of light just above his head, and far enough back to leave his face in shadow. He is told to look at the observer's forehead. The observer stands in front of the patient armed with a plane mirror; the simplest form being a piece of looking-glass one inch wide, three inches long, with the silvering scraped from two-thirds its length, and a hole three millimetres in diameter at the centre of the square that remains. With this mirror the light is reflected upon the patient's eye and face. Now, by rotating the mirror to the right about its vertical axis, the area of light upon the patient's face (facial area) is made to move to the right; by rotating it in the opposite direc-

tion, the facial area is moved to the left. By rotating it in other directions about other axes, the facial area may be made to move upward or downward, either vertically or at any oblique angle. Now the light which falls on the pupil passes back and forms on the pigment coat of the retina a second smaller area of light, the retinal area. This retinal area, it can be readily demonstrated, moves when the facial area moves, and always "with" it, that is, in the same direction. But the observer, by placing his eye at the central aperture of his mirror, can study in the patient's pupil the direction of the apparent movement of this retinal area. This will correspond to the direction of real movement when an erect image is viewed, but will be the opposite of the direction of real movement when an inverted image is under inspection. Hence, the *real* movement of the retinal area being always with the facial area; when the *apparent* movement of the retinal area is with the facial area, the fundus is perceived in the erect image; when the apparent movement of the retinal area is against the movement of the facial area, the fundus is perceived in the inverted image. So much for the optical basis of the test. Let us now consider its practical application in the various states of refraction.

Simple Myopia.—Rays of light from any given point of the retina emerge from the myopic eye convergent, and meet at the point in front of the eye, for which the eye is optically adjusted. The accommodation being in abeyance, this will be the far point of distinct vision. So that there is formed at the far point of the myopic eye an inverted image of the retina. If now the eye of the observer be placed between the patient's eye and its far point, there will be seen an erect image of the patient's retina; but if the observer view the patient's eye from somewhere beyond its far point, he will see, not an erect image, but the inverted image formed at that far point. In the first case the boundary of light and shade which marks the border of the retinal area will appear to move with the facial area; in the second case, against it. In practice the surgeon begins the examination somewhat more distant from the patient than the far point of the eye under examination. Then he slowly approaches the patient, all the while watching the apparent movement of the retinal area produced by slightly rotating the mirror from side to side about its axis. As long as this apparent movement is opposed to that of the facial area, the surgeon knows he is watching the inverted image at the patient's far point. Presently, however, the direction of the movement of the retinal area cannot be distinguished, the far point has now been reached; and coming still closer the apparent movement again becomes distinct, but is seen to correspond in direction with the real movement, the far point has now been passed, and the patient's retina is being viewed in the erect image. By noting the point at which this reversal occurs, the surgeon notes the far point of the eye under observation; by

measuring the distance from this point of reversal to the eye, he measures the distance from the patient to his far point of distinct vision; and the reciprocal of this distance, of course, expresses the degree of his myopia. Thus, supposing the point of reversal to be one-fourth of a metre in front of the eye, one divided by one-fourth equals four, the number of dioptries of myopia present.

Theoretically, the method as now described is complete, but for convenience and accuracy in its application, one or two other points must be attended to. When the observer's eye has come quite close to the patient's, say to within one-eighth of a metre, and the inverted image is still seen between them, it is best to place a concave lens (-8 . D) before the patient's eye, and then to estimate the amount of myopia remaining uncorrected; and by adding it to the amount which the lens used has corrected, determining the total myopia present. When the observer has approached so near the inverted image that it lies closer to his eye than his near point of distinct vision, he can no longer see that image distinctly. Still he can distinguish in which direction the retinal area appears to move, until he approaches somewhat nearer to the image, when the circles of diffusion upon his own retina become so large that the retinal area of light, seen in the patient's pupil, seems very diffuse and faint, and the direction of its apparent movement uncertain. Because of this, there is great practical difficulty in determining exactly where the point of reversal is situated. Now it is evident that if the point of reversal is within a few inches of the eye, an error of two or three inches as to its position entails an error of some dioptries in the amount of myopia present. Therefore, when by the method above described the degree of myopia has been approximately ascertained, place before the patient's eye a concave lens strong enough to remove the point of reversal a metre or more from the eye. At such a distance, an error of two or three inches as to the position of the point of reversal is of no consequence; and an accurate determination of the remaining, and hence of the total myopia, can readily be made. Having determined the amount of myopia present, the surgeon will of course be guided by the rules he would follow had the myopia been measured by any other method.

Hypermetropia.—On viewing the fundus reflex it is found that at all distances the erect image is seen, and the retinal area appears to move with the facial area. Place before the patient's eye a convex lens strong enough to over-correct the hypermetropia. Then, by the method given above, determine the degree of myopia so produced. Deduct this amount of myopia from the strength of the convex lens used; and the remainder will express the degree of hypermetropia present. Suppose, for example, the hypermetropia amounts to four dioptries. Placing a five dioptre convex lens before the eye it is found that one dioptre of myopia is produced, the point of reversal being at one metre. Then five, minus one, equals

four, which expresses in dioptries the amount of hypermetropia present. Should it be found that the $+5$ D. lens leaves the eye hypermetropic, so that the erect image is seen at all distances, replace it by a $+10$ D., and proceed as before. As in myopia, however, the final accurate determination should be made at a distance of not less than one metre. It may be noticed that low degrees of myopia may be measured without the use of any lens, but that to determine the degree of hypermetropia present, a convex lens is always necessary.

Emmetropia is determined by the method for measuring hypermetropia. The convex lens being placed before the eye, the resulting myopia is found to equal exactly the strength of the lens in use.

Regular Astigmatism.—In applying the test to the measurement of regular astigmatism, instead of rotating the mirror about any axis, vertical, horizontal, or oblique, as may be done when the curvature of the cornea is the same in all directions, it is rotated about axes perpendicular to the directions of the principal meridians of curvature, and the point of reversal thus found for each principal meridian. To determine the direction of these principal meridians, the eye, if not previously so, should be rendered myopic in all meridians, and then viewed from different distances. It will then be found that at certain points the fundus reflex takes the shape of a more or less distinct band of light stretching across the pupil, while on one or both sides of it may be seen a shaded area, "the somewhat linear shadow" of Bowman. This band of light is very readily moved in a direction perpendicular to its length, but in the direction of its length cannot be made to move at all. The point where this appearance is presented is the point of reversal for that principal meridian of the cornea, whose direction coincides with the length of the band. The other principal meridian is, of course, at right angles to this; and the observer by placing his eye at its point of reversal will be in position to see a similar band extending in a direction perpendicular to that of the band first observed. This use of the shadow-test may be made clearer by the consideration of what occurs in a particular case. Suppose the patient's cornea to have such a curvature as to cause in the horizontal meridian (axis vertical) a hypermetropia of four dioptries, and in the vertical meridian (axis horizontal) a myopia of one dioptre. Place before the eye a $+5$ D. spherical lens. On approaching it from a distance, it is found that the retinal area moves against the facial area in all directions. But as the distance of one metre is approached, it is noticed that the retinal area takes the form of a horizontal band, readily movable upward or downward, but difficult to move to the right or left; and when the point of one metre is reached, all movement to the right or left ceases, and the band is most distinct. Going still closer, the point of reversal for the horizontal meridian being passed, movement to the right or left reappears, but it is now with the facial area. The movement upward or

downward is still against that of the facial area. As the patient is still approached, the appearance of a horizontal band fades out, and presently is replaced by that of a vertical band. The vertical band moves readily to the right or left, but less distinctly upward or downward, and at one-sixth of a metre all vertical motion is lost. This is the point of reversal for the vertical meridian. On approaching still closer, vertical movement reappears, but like the horizontal movement it is now with the facial area, not against it. Thus it is found that for the horizontal meridian the point of reversal is one metre distant from the eye, and that for the vertical meridian the point of reversal is one-sixth metre distant. That is, the use of the convex lens has made the eye myopic in the one meridian one dioptré, in the other meridian six dioptries; and by taking into account the effect of the spherical lens used, the mixed astigmatism is seen to be what we supposed it. But for accurate work, as in simple myopia and hypermetropia, the degree of ametropia for each meridian should be finally determined with such a lens before the eye as would place the point of reversal, for that meridian, one metre or more distant.

The apparent form of the fundus-reflex, its brightness and rapidity of movement are matters of very little importance in connection with the shadow-test, as I have endeavored to describe it; except in the case of astigmatism. Of regular astigmatism I have spoken. Of *irregular astigmatism*, it may be said that it gives to the fundus reflex forms infinitely numerous. Two only need be mentioned here, the central bright point and shaded circle by central illumination, changing to a light and a shaded area, separated by a boundary angular at the centre of the cornea, when the mirror is turned, which has long been known to indicate conical cornea; and a bright circle at the margin of the pupil, with a fainter central area, which indicates curvature of the crystalline lens, greater towards the margin than near the centre of the pupil. Generally this condition exists, if the pupil be fully dilated, and the effect is puzzling to one unpractised in the shadow-test, because the ring or crescent at the edge of the pupil reverses closer to the eye than does the image at the centre of the pupil; and the latter reversal, though less striking, is the one of practical importance. The danger of the error being recognized, however, it will, after a little practice, be readily avoided. Although the presence of irregular astigmatism thus makes the shadow-test somewhat more difficult of application, the test in certain cases, as in the "faceted" cornea, certainly affords the best means of measuring the general state of refraction. It is a point of practical importance that the appearance of the fundus-reflex also depends on the shape, size, and practical distance of the source of light; the practical distance of the source of light being the distance from the light to the mirror, plus the distance from the mirror to the patient's eye. A large irregular flame, close to the patient's eye, will not give the band-like appearance characteristic of regular astigmatism;

this appearance being presented only in so far as the source of light approximates to the condition of a mathematical point. On the other hand, the source of light must not be so small that the fundus-reflex will entirely disappear when the light is reflected to the patient's eye from the region of the central aperture in the mirror.

The advantages of the shadow-test, as above described, are, that it is most widely applicable, has the certainty of an objective method, the accuracy of trials with test-lenses, and the rapidity of the optometer. It is applicable in the cases of young children, the amblyopic and malingerers, in which subjective tests cannot be used; and in cases where restlessness, nystagmus, hazy media, or the loss of the other eye, render accurate examination in the erect image by a refraction ophthalmoscope difficult or impossible. In certainty, when the patient retains the power of accommodation, it seems to me inferior to the "direct method" as a means of discovering and measuring latent hypermetropia. But it is superior to the direct method in the detection and estimation of astigmatism.

Assuming that the amount of regular astigmatism does not vary, by reason of unequal contraction of the ciliary muscle, quite low degrees of it (less than a half dioptré) can be recognized, measured, and the axis fixed, in the face of varying accommodation. Again, the shadow-test is free from any possibility of error due to the observer's unconscious accommodation; and this seems to me no small matter, at least for young observers. I know there are times when, after taxing my own eyes with close work, a certain error of unconscious accommodation vitiates my work with the refraction ophthalmoscope. The shadow-test avoids this entirely. Charnley has stated (*loc. cit.*, p. 357) that "the observer, if not emmetropic, must correct his ametropia," and the error is perpetuated in the American description of the shadow-test, as practised in English hospitals. (A. R. Baker, *Retinoscopy*, *Am. Journ. of Ophthalmology*, vol. i. p. 116.)

The observer's ametropia only interferes with the use of the shadow-test when it prevents him from seeing, with sufficient clearness, objects a few feet distant. In accuracy, the test in my experience very nearly equals the subjective test with trial lenses for patients who have good vision, good intelligence, and honesty; for patients lacking in any of these requisites for subjective testing, it is markedly more accurate than any other method. In all cases where the state of refraction is to be measured accurately, it effects a saving of time; in the stupid or sluggish this saving is very great.

The shadow-test may be looked upon as the union and evolution of two modes of examination almost as old as the ophthalmoscope itself, namely, the twirling of the mirror to detect conical cornea, and the examination of the myopic eye by the indirect method, without the intervention of an

object lens. Those who desire to study more minutely the history of that evolution, and to assign due credit to those who have aided in the process, will find the appended references a valuable addition to those already given in the text.

Win. Bowman, Paper on Conical Cornea, Roy. Lond. Oph. Hosp. Reports, vol. ii. p. 157. F. C. Donders, Accommodation and Refraction, London, 1864, pages 106, 490, and 551. John Couper, The Ophthalmoscope as an Optometer in Astigmatism; Report of the Fourth International Ophthalmological Congress, London, 1872, page 109. E. G. Loring, Determination of the Refraction of the Eye with the Ophthalmoscope, New York, 1876, pages 47-51.

ARTICLE VIII.

A STUDY OF THE SUBJECT OF SPONTANEOUS RUPTURE OF THE MEMBRANES AT FULL TERM OF GESTATION PRECEDING THE BEGINNING OF LABOR.
By G. W. H. KEMPER, M.D., of Muncie, Indiana.

My attention was first called to this subject eleven years ago, upon reading this statement: "Having described the formation of the bag of waters, Dr. Gartipny proves, by the notes of two thousand deliveries, that its spontaneous rupture is of frequent occurrence. The premature flow of the waters hastens the labor, and exercises no injurious influence on the mother or child. Its occurrence is therefore favorable when pregnancy has arrived at full term."¹

This declaration was at such variance with my own opinion, formed upon the teaching of standard works on obstetrics, that I determined to investigate the subject. I accordingly turned to my obstetrical case-book for my own experience. My investigations at that time were given to the public in a paper entitled: "Is Labor protracted by early Spontaneous Rupture of the Membranes?"² In a record of two hundred cases, I found the membranes had ruptured before the beginning of labor in ten cases, showing an average of one in twenty cases. I further ascertained that in every case the child was born alive, the mother did well, and the average duration of the labors was eight hours and six minutes.

A more extended experience of ten years has afforded me facilities for an enlarged study of the subject.

I offer for consideration the following table of 50 cases of spontaneous rupture of the membranes, occurring in my first 700 obstetrical cases. I may state that all the cases were carefully recorded in my case-book, and I will vouch for their accuracy.

In every case the rupture of the membranes preceded labor-pains, so that the length of time from that event to the beginning of pains, and ces-

¹ Obstet. Jour. of Great Britain and Ireland, Dec. 1873, p. 629.

² American Practitioner, June, 1874, p. 334.

sation of labor was definitely determined. I have indicated the expulsion of the child, and not the placenta, as the time of reckoning. The duration of the third stage of labor would average about ten minutes.

As a question of diagnosis, I may say that while I have met with cases of hydrorrhœa gravidarum, of authors, they have not been included in the following table :—

No.	Age	No. of labor.	From rupture of membrane to beginning of pains.	Duration of labor from beginning of pains.	Remarks.
1	33	VI para	3 hours	7 hours	Male. Vertex pres.
2	15	I "	4 hours	10¼ "	Female. Vertex. Illegitimate.
3	...	III "	At once	2¾ "	Male. Vertex.
4	20	I "	"	10½ "	Female. Vertex. [well.
5	21	I "	"	8½ "	Male. Vertex. Stillborn. Mother did
6	41	IX "	"	20 "	Female. Vertex. Always tedious.
7	28	V "	"	5 "	Male. Vertex. Rup. while asleep.
8	17	I "	"	18 "	Female. Vertex.
9	30	V "	2 days	6 "	Female. "
10	36	VII "	23 hours	9 "	Male. Vertex. Rup. while asleep.
11	38	VIII "	11 hours	10½ "	Female. Vertex. 9, 10, & 11 same
12	33	VI "	At once	6½ "	Male. Vertex. [woman.
13	24	II "	3 days	6 "	Female. "
14	21	I "	At once	7½ "	Female. "
15	19	I "	"	7 "	Male. "
16	24	II "	3 hours	9¼ "	Male. "
17	40	X "	At once	3 "	Female. "
18	26	III "	18 hours	3½ "	Male. Vertex. Same as No. 13.
19	22	II "	At once	5½ "	Male. Vertex.
20	34	III "	"	4 "	Female. "
21	25	II "	3 days	3¼ "	Female. " [footling.
22	22	II "	At once	6 "	Female and male (twins). Ver. and
23	22	I "	"	11 "	Male. Vertex. (A rigid os.)
24	39	V "	3 weeks	10 "	Male. Vertex. Rup. after a fall.
25	28	III "	2 hours	3 "	Male. Vertex.
26	22	I "	At once	8¾ "	Female. "
27	26	III "	"	16 "	Male. "
28	30	II "	"	5½ "	Male. "
29	24	II "	34½ hours	3 "	Female. "
30	24	II "	At once	10¾ "	Male. "
31	25	II "	36 hours	3¼ "	Male. "
32	26	I "	At once	8¼ "	Female. Breech. Forceps.
33	42	VIII "	3 hours	7¼ "	Female. Vertex.
34	36	VII "	"Soon after"	4½ "	Male. "
35	44	XII "	Shortly after	17 "	Male. Breech. Stillborn.
36	25	III "	7 hours	4½ "	Female. Vertex.
37	19	I "	1½ hours	4½ "	Female. "
38	26	II "	2 hours	14¼ "	Female. "
39	26	II "	6 hours	9½ "	Female. "
40	24	II "	47 hours	6 "	Female. "
41	24	II "	At once	2 "	Male. Vertex. Rup. While asleep.
42	19	I "	"	6 "	Female. Vertex.
43	24	I "	4 days	6¼ "	Male. "
44	24	I "	5 hours	9 "	Female. "
45	23	I "	At once	21 "	Female. "
46	26	II "	"	7¼ "	Female. "
47	21	I "	16 hours	7½ "	Male. "
48	26	IV "	1 hour	8¼ "	Female. "
49	30	I "	1 hour	17¾ "	Female. Footling, Funis. Stillborn.
50	38	VII "	12 hours	6 "	Female. Vertex.
				407 hours	Average 8 h. 8 m. 24 sec.

An analysis of the preceding table shows that spontaneous rupture of the membranes is not an infrequent event, as it occurred 50 times in 700 cases, or one time in every 14 labors.¹

In 23 instances labor set in "at once" when the membranes ruptured. In 11 other cases pains had supervened at the expiration of four hours. In only 8 cases were pains delayed beyond twenty-four hours. The longest delay was three weeks.

Of the 50 cases, 16 were primiparæ, and 34 multiparæ. The 50 women were in labor, aggregating 407 hours, making an average of 8 hours, 8 minutes and 24 seconds.²

The 16 primiparæ were in labor aggregating $161\frac{3}{4}$ hours, averaging 10 hours and $6\frac{1}{2}$ minutes each. The shortest time of labor for a primipara (No. 37) was $4\frac{1}{2}$ hours; the longest (No. 45) 21 hours.

The 34 multiparæ were in labor aggregating $245\frac{1}{4}$ hours, averaging 7 hours and $12\frac{3}{4}$ minutes each. The shortest time of labor for a multipara (No. 41) was 2 hours; the longest (No. 6) was 20 hours.

A comparison of the cases where labor began early after rupture of the membranes, with those where it was delayed, will be of some interest. Of the 23 cases in which pains began "at once," 10 were primiparæ and 13 multiparæ. These 23 women were in labor 200 hours and 45 minutes, so that the duration of labor averaged 8 hours and $43\frac{1}{2}$ minutes. Of the remaining number 27, 6 were primiparæ and 21 multiparæ. These 27 women were in labor 206 hours and 15 minutes, average duration of labor 7 hours and $38\frac{1}{3}$ minutes. This comparison shows that in cases where labor-pains are delayed for a time, the duration of labor is 1 hour and 5 minutes shorter than in cases where pains supervene "at once." The latter class, however, is favored by the greater proportion of multiparæ. The proportion of primiparæ in the former class would indicate that labor is more likely to supervene "at once" after the membranes are ruptured, with primiparæ than multiparæ.

The ages ranged from 15 to 44 years—classified as follows: 15 to 19 years = 5; 20 to 29 years = 29; 30 to 39 years = 11; 40 to 44 years = 4; and unknown 1.

Of the 50 labors, 49 were single, and 1 a twin birth, so that 51 children were born, according to sex, 23 males and 28 females. One child was illegitimate.

The presentations were: vertex 47, breech 2, and footling 2. Forceps was used in one case (No. 32) to deliver the after-coming head.

¹ Dr. J. C. Bliss in 820 cases of delivery found the membranes broke "before or at the accession of labor" 79 times, or about one time in 10 labors.—AM. JOUR. OF MED. SCIENCES, July, 1847, p. 272.

² In Dr. Bliss's 820 cases (*op. cit.*) the average duration of labor was $10\frac{3}{4}$ hours. He remarks: "This shows that this occurrence did not very materially retard the progress of parturition."

The result to the mother was favorable in every case.

The mortality to the children was 3, or 1 death in 17 births; 2 of these were males and 1 a female. The 3 cases of stillborn children were rather unusual ones, and such that a fatal result was liable to occur under more favorable circumstances. The first (No. 5) occurred with a primipara, of short stature. The presentation was a vertex, and the child, a male, weighed ten pounds. The head was markedly elongated, indicating a narrow parturient canal. The case occurred early in my practice, before I had sufficient courage to resort to the forceps, a procedure that might have led to a better result. Had the bag of waters been present to a late period of the labor, the result might have been different; if so, however, I believe it is the only case of the three in which the fatal result could be attributed to the early rupture of the membranes. Three subsequent labors of this woman have been prolonged and hard. The second (No. 35) occurred with a woman aged 44 years, and in her 12th labor. The child, a male, presented by the breech. The surroundings of the family for some time previous had been such as to debilitate the patient. The third (No. 49) was a primipara, aged 30 years. The child, a female, presented by both feet, and the funis was prolapsed. My record reads: "The head was not delayed. I think the death was due to the continued pressure by the body on the cord."

The occurrence of the early rupture of the membranes would appear to be common to certain women. Cases 9, 10, and 11 occurred with the same woman in successive pregnancies; also 13 and 18 are successive pregnancies of another woman. Bard mentions this liability of certain women. I have noticed the occurrence of this accident in patients near the same date, insomuch that I have been led to suspect that atmospheric changes might be a factor.¹ More than one-half of my cases occurred in the four months of November, December, January, and February, a fact pointing to the possibility of cold weather being an exciting cause.

As a summary of the views and facts stated in the foregoing paper, the following deductions may be drawn:—

1. The spontaneous rupture of the membranes at full term of gestation, and preceding the beginning of labor-pains, is an event of common occurrence, averaging about once in every fourteen labors.

2. When the membranes are broken, as a rule, labor supervenes at once, or within the next four hours, but may be delayed several hours, days, or even weeks.

3. When such an accident occurs, the duration of the labor is not necessarily prolonged, nor rendered more painful.

¹ On November 16, 1884, while this paper was in preparation, I attended three women in labor, and the rupture of the membranes preceded labor in each case.

4. The mortality of the mothers is not augmented, and the ratio of stillborn children, if at all, is so slightly increased as to amount to a minimum.

5. The causes are not well defined. The repetition of the accident in certain women shows that with some a tendency is inherent. A possibility of atmospheric influences, especially a low temperature, as an exciting cause is admissible. Smellie considered obesity a cause. My observations have not confirmed his statement. Cazeaux considered that such cases were coincident with a presentation of the vertex that is deeply engaged in the excavation.

6. It is probable that the duration of labor is shorter in cases where the appearance of pains is delayed for some time after the membranes are ruptured.

7. The proper plan of treatment as given by Smellie, McClintock, Bard, Denman, and Dewees, and corroborated by my own experience, *is rest*, if necessary in a recumbent posture, *and patience*. All efforts to excite labor-pains are hurtful, meddlesome, and mischievous. *Wait for pains, and treat the case on general principles!*

8. Finally, that the fear of delay and danger in this class of cases,—the classical “dry labor,”—promulgated by our early obstetrical fathers, and endorsed by successive authors generally, is based on the merest spark of truth, and is one of those medical traditions that experience shows to be over-estimated and to a large degree apocryphal!

ARTICLE IX.

A CONTRIBUTION TO THE PATHOLOGY OF MALARIAL FEVER. By W. T. COUNCILMAN, M.D., Associate in Pathology Johns Hopkins University, and A. C. ABBOTT, M.D., Baltimore, Md.

In the summer and autumn of 1884, an unusually good opportunity was given to the writers for the study of the pathological lesions produced by malarial fever. Bay View Asylum, the almshouse of the city of Baltimore, receives a large number of malarial cases from Harford County, and other of the more malarious counties of the State. Most of these cases received in the time named were of the ordinary type, recovered soon under the use of antiperiodics, and left the house. There were, however, several cases, nine in all, that died either from the disease itself, or from some other affection that intervened in the course of the disease. Post-mortems were made on these cases a very short while (four or five hours) after death, and most of the organs subjected to a critical and prolonged microscopic examination. Two of these cases died from a form of malarial poisoning,

which, though not uncommon in the South, and especially in Algeria, is not met with very often in our latitude.

These two cases were particularly interesting from certain changes found in the contents of the bloodvessels in the brain and other organs. These changes will be described at length, because they seem to shed some light on various observations which have been made by French authors in Algeria and elsewhere.

CASE I.—An unknown man was sent to the almshouse from a low boarding-house on Market Space. He was received September 12th, at 5 o'clock in the afternoon, and was then in a profoundly comatose condition; temperature in axilla 101.4° Fahr. No history could be obtained from the men who brought the patient, and of course nothing could be learned from the patient himself. He died during the early hours of the morning. On making inquiries from the keeper of the small boarding-house where the man had lodged, nothing more definite could be learned than that he was a laborer, and had, probably, worked at some of the excavations along the railroad. The day before the man was sent to the asylum, after two or three days' residence in the boarding-house, he was taken sick; complained of drowsiness, loss of appetite, and general weakness. His condition gradually became worse, and the next morning he fell into a comatose condition from which he never rallied. The post-mortem examination was made September 13th, at 9 A. M., five hours after death.

Body large; tolerably well nourished; anterior surface of the body pale, on the posterior surface a good deal of post-mortem congestion; no œdema. Scalp pale; skull of ordinary thickness; dura mater lightly adherent; pia mater slightly thickened and œdematous, easily stripped off from the surface of the brain. The cortex of the brain was throughout of a dull chocolate color. This color seemed more pronounced in the gray than in the white matter, although the white matter was slightly darker than normal; the line of demarcation separating the white from the gray was apparently more pronounced. This sharp demarcation gave the gray matter the appearance of being lessened in width. The central ganglia of the brain partook of the same color as the cortex. The pia mater of cord hyperæmic; the cord itself darker; the gray matter of the same color as the cerebral cortex. The thyroid small. In the trachea a small quantity of mucus. Its mucous membrane, as well as that of the pharynx, larynx, and œsophagus, very pale and anæmic. In the pericardial cavity, a slight quantity, about $1\frac{1}{2}$ oz., of slightly yellowish serum. Heart's flesh firm; its valves normal. Both lungs intimately adherent to the pleura. Lung tissue inflated and contained much pigment. At the anterior edges of both lungs there was a slight degree of emphysema. The peritoneum smooth and glistening; liver enlarged (4 lbs. 12 oz.), soft, and of a dark slaty color; on cutting its tissue, it was found very hyperæmic. Spleen was very much enlarged, 7 inches long, 4 wide, and 2 thick, and of an almost black color, with a tinge of gray. Kidneys of ordinary size, capsule easily stripped off. The cortex full and hyperæmic; no pigmentation could be made out. In the small intestine, fluid contents tinged with bile; mucous membrane normal. Large intestine distended with gas and fecal matter. Pancreas of ordinary size, color, and consistency; stomach empty, its mucous membrane slightly hyperæmic, and in several places there were

small hemorrhagic erosions. Supra-renal capsules in no way changed. Bladder slightly distended. The voluntary muscles and subcutaneous tissues presented no abnormal discolorations. Small portions of the spleen, liver, kidneys, lung, brain, and cord were placed at once in a large amount of absolute alcohol for microscopic examination. In addition, pieces of the brain and cord were placed in Müller's fluid.

Spleen.—Microscopic examination showed considerable passive congestion in this viscus. There was a large amount of pigment present, which appeared principally under two forms. In one form the pigment granules were large and irregular in shape, though generally with rounded outlines. The pigment was of an intensely dull black color. These irregular pigment masses were of various sizes, from mere granules up to the size of a white blood-corpuscle and larger. They were both free and inclosed in cells which were apparently white blood-corpuscles. The second form under which this pigment appeared demands special consideration. It was inclosed in numerous extremely small hyaline-looking bodies. The most of these were about one-third the diameter of a red blood-corpuscle. They were generally rounded, but sometimes slightly irregular in outline. They seemed to be composed of a pale, almost hyaline, or very slightly granular substance, which was stained slightly by Bismarck brown, and gentiana violet. This staining was so slight that it was only certainly seen by the use of the Abbey illuminator without the diaphragm, thereby rendering the color picture much more apparent than when the Abbey was used with diaphragm. Within these small masses a quantity of intensely black pigment was seen, which assumed various forms. When the specimens were examined with a $\frac{1}{20}$ th homogeneous immersion without the diaphragm, it appeared in most cases in a horse-shoe shape, similar to the nucleus of a white blood-corpuscle. Sometimes this pigment formed a connected mass, at others it took the form of a collection of separate granules. These granules were so small, that they could only be resolved with lenses of the highest power. In most cases the small hyaline bodies referred to appeared to be in the interior of red blood-corpuscles, usually at their margin. Very often large collections of blood-corpuscles containing these masses were seen; at other times one or two only would be met with in the field of the microscope. Seldom more than one was found in a single corpuscle. In a few cases, however, two were seen. In a few instances the pigment granules seemed to be arranged in the bodies in a circlet. In *all* cases, there was no irregular distribution of the pigment through the masses, but it was always collected together. No pigment was found in the trabeculæ of the spleen. There were some large swollen cells, evidently white blood-corpuscles, which also contained the hyaline bodies. In the majority of cases, these large cells contained the large irregular masses of pigment first mentioned.

Liver.—The liver-cells were of ordinary size, and contained rather more than the usual amount of bile pigment. In the capillaries there was a great quantity of pigment in the form of the large irregular masses described in the spleen. It was seldom lying free in the vessels, but was for the most part inclosed in large cells. These cells were frequently of an enormous size, filling up the capillary bloodvessels for a considerable distance. They were composed of very pale protoplasm, and contained one and sometimes two irregularly shaped and tolerably brightly stained nuclei. They were generally oblong, conforming to the shape of the liver capillary, which they entirely filled. In size, many were three or four

times that of a liver-cell, others were very much smaller, and every gradation could be seen from those of the size and general appearance of a leucocyte up to the large masses spoken of. Here and there after long search, a few of the small hyaline masses, spoken of in the spleen, were found both within red blood-corpuscles and the large swollen white corpuscles.

Lungs.—In the lungs there was so much of the ordinary carbon pigment present that but little could be said with certainty about the other pigment; still, without doubt, there was a good deal of the latter contained within the bloodvessels of the alveoli, in cells similar to the large cells spoken of in the liver and spleen.

Kidneys.—The epithelium of the convoluted tubules was swollen and granular, in many cases entirely filling the lumen. There was a slight degree of small cell infiltration around the glomeruli and in other places. The staining of the nuclei of the convoluted tubules was often dimmed in consequence of the extremely granular condition of the protoplasm. A considerable amount of pigment was found in the vessels of the glomeruli, and in vessels of larger calibre which were seen in cross section. This pigment was all contained in large cells. *None* of the small hyaline bodies spoken of elsewhere were found here.

Brain.—On microscopic examination this presented a remarkable appearance; with a low power the bloodvessels appeared as if they were artificially injected with a black injecting mass. On closer examination with an ordinary power of three hundred diameters, they appeared to be filled with very small granules of pigment. By the use of very high powers (oil immersion $\frac{1}{20}$ and Abbey illuminator), the pigment was found to be almost entirely contained in the small hyaline protoplasmic masses spoken of in the spleen. These lay exclusively within the capillaries; sometimes they were inclosed in the bodies of red blood-corpuscles, sometimes they were free. From the great numbers of these masses in the brain they could be studied better here than in any other place. It could be distinctly seen that they were stained and appeared to be composed of a hyaline or very finely granular substance. Their diameter, as said before, was about one-third that of a red blood-corpuscle. The pigment within them presented the same appearance and arrangement as in the spleen. In some, the circular arrangement of the pigment granules was very obvious. There was scarcely a capillary in the gray substance of the brain that did not contain these bodies in greater or less numbers. Some of the vessels were filled with them, and no blood-corpuscles could be seen. Others contained both the hyaline masses and blood-corpuscles. At various places in stainings, made both with Bismarck brown and gentiana violet, hyaline masses were found containing *no* pigment, which stained in the same way and were of the same shape and size as those which contained the pigment. Others were found which contained but one or two pigment granules. The white substance of the brain also contained these pigmented hyaline masses, but in much smaller numbers. The ganglion-cells stained in the ordinary manner, and there appeared to be no change in the histological structure of the brain.

In the specimens examined after hardening in Müller's fluid, the pigment was very perceptible, but the hyaline masses were very difficult to make out. In these specimens another thing was noticed which was not apparent in the specimens hardened in alcohol. Numerous very small hemorrhages were found along the course of the vessels; sometimes but

one or two red blood-corpuscles seemed to have escaped, at others the hemorrhage was much larger. It is most remarkable that in these hemorrhages *none* of the pigmented hyaline masses nor any free pigment was found.

Cord.—The cord presented the same general microscopic characters as the brain. The bloodvessels were filled with the pigmented hyaline masses, which appeared to be more numerous in the gray than in the white matter. The blood-corpuscles in sections, both of the brain and spinal cord, appeared to have retained their normal aspect; even when they contained the pigmented bodies they were no paler than normal.

CASE II.—Wm. Burr, *at.* 67 years; occupation laborer; born in Mass.; admitted April 22, 1884; died October 9, 1884. He came into the hospital on the above-named date suffering with asthma, which he had had at intervals for several years. He remained under treatment until May 13th, at which time he had sufficiently recovered to be transferred to the "chronic wards." From this time until he died he enjoyed good health, was able to assist the ward master in his daily duties, and ate heartily every day. The first symptom of his last attack was the flighty condition of his mind; this gradually grew worse, and at the end of seven days he was in profound coma and died. While in hospital his urine was albuminous, Bright's disease had consequently been diagnosed, and his present attack was supposed to be one of uræmic coma.

Post-mortem made a few hours after death. Body large, strongly built; muscular tissue well developed; subcutaneous adipose tissue scanty; anterior surface of body pale; posteriorly, some amount of congestion; scalp pale; skull of ordinary thickness and pale; dura mater adherent; pia mater hyperæmic.

The brain cortex presented exactly the same appearance as in the preceding case. It was of a dark chocolate color; ventricles of brain slightly distended with clear serum; meninges of cord slightly hyperæmic; cord itself darker than normal, especially the gray columns of the same, which stood out in bold contrast with the white. Mucous membrane of the larynx, pharynx, and œsophagus pale; a slight quantity of mucus in the trachea; thyroid small; both lungs free from adhesions, posterior portion of lungs very hyperæmic. On pressing the lung substance a slight amount of pus could be squeezed from the smaller bronchi. Mucous membrane of bronchi red and congested. There was a slight degree of eccentric hypertrophy of left ventricle of the heart. Heart's flesh firm, its valves normal. The liver enlarged, weight three pounds, fourteen ounces, and of a dark grayish color. On section, considerable blood escaped. Spleen enlarged, weight one pound nine ounces, and so soft, that when taken in the hand it felt like a bladder full of fluid. It was intensely congested and of a dark, almost black, color.

Kidneys of ordinary size, capsule in some places adherent, so that on pulling it off, portions of the kidney substance were torn away with it. Tissue of the kidneys firmer than normal, cortex slightly diminished in thickness. Intestines slightly distended. In the right tunica vaginalis was a hydrocele as large as a lemon. Marrow of long bones appeared normal.

Microscopic examinations at the time of the post mortem were made of scrapings from the marrow of the bones, and of blood taken from the right heart. In the bone marrow a slight amount of pigment was found, both free and inclosed in cells. The blood, which was of a laky color, contained here and there pigment granules inclosed in white corpuscles.

Portions of the brain, cord, lung, liver, spleen, and kidneys were placed at once in a large amount of absolute alcohol. Portions of the nervous tissues were also hardened in Müller's fluid. An examination of the *brain* showed the capillaries of the gray and white matter, but especially the former, to be filled with small masses of pigment. Examination with higher power, $\frac{1}{20}$ oil immersion and Abbey illuminator, showed the pigment to be contained in the *small hyaline masses* described in Case I. It was distinctly seen that these bodies stained with Bismarck brown. Sections of the brain were also examined both in glycerine and in water without staining. In the sections mounted in glycerine these hyaline bodies could only be seen with the greatest difficulty; this was evidently due to the similarity of their index of refraction to that of the glycerine. In sections mounted in water, on the other hand, they were very easily seen and appeared to be composed either of homogeneous or very finely granular protoplasm. In size they varied from the one-fourth to one-half of that of a red blood-corpuscle. The pigment contained in them assumed various forms—sometimes that of a stellate figure, at other times that of a cross; and some figures appeared not unlike the figures in a nucleus when it is undergoing division.

Especial stress should be laid on the regularity in the size of the hyaline bodies, and the general agreement in character of the pigment contained in them. Generally, the vessels were not distended with red blood-corpuscles, nor were the hyaline masses so often contained in these, as was the case in Case I.

The *spleen* was so crowded with lymphoid cells and red blood-corpuscles that it was difficult to study closely the finer histological details. In numerous places, however, especially in the well-defined bloodvessels, an arrangement of pigment could be made out in all respects identical with that in the brain. Small hyaline masses, which stained faintly with the anilines, were seen, sometimes encased in red blood-corpuscles, at other times lying between them.

In addition to these, the ordinary larger or smaller irregular masses of pigment were found, sometimes free, sometimes inclosed in large cells.

In the *liver* the quantity of pigment was much less than in the brain and spleen; only the irregular masses of it were found in the capillaries inclosed in large cells similar to those spoken of in Case I.

Kidney.—In the kidney the epithelium of the convoluted tubules was swollen and granular. On examination with high power the epithelial cells in many places were found to be converted into large granular masses in which there was no trace of a nucleus. This change was confined solely to the convoluted tubules. Immediately beneath the capsule and in a few other places, some of the glomeruli were shrunken and converted into fibrous masses. In other places there was only a thickening of the capsule of the glomerulus. This change was by no means general in the kidney; in most places the glomeruli were completely unchanged; at two or three points there was a considerable amount of small cell infiltration. Numerous casts were found both in the tubes of Henle and in the collecting tubes. The pigmentation of the tissues was most evident even under a very low power. The pigment seemed here to be distributed with more irregularity than in any other organ examined. It was found in the bloodvessels, in the effused blood at one or two points of hemorrhage, and especially in the glomeruli. It was both free and inclosed in large cells. *None* of the small hyaline masses were found at any point, although a most careful search was made for them.

The lungs showed a slight amount of bronchitis, with a slight cellular exudation into some of the alveoli immediately in the vicinity of the small branchioles. Pigment was found here in the bloodvessels. It could not be said with certainty whether the pigment lying in the tissues outside the capillaries was the malarial pigment or the ordinary carbon pigment of the lungs.

We have described these two cases in full, and it will be found that the gross pathological lesions agree in every detail with the lesions found in the comatose form of malarial fever described by French authors. A case of this form of fever, with a full account of the autopsy, was published by Dr. Meigs, and referred to at length by Dr. Sternberg in his valuable treatise on malaria.¹ In this case, reported by Meigs, an unknown man was brought to hospital in an absolutely unconscious condition, from which he could not be aroused. No further history could be obtained, except that he came from a southern malarious district, and had been suffering from fever. At the autopsy, made four hours after death, the brain was found to be of a chocolate-gray color. On its section surface the delicate tortuous vessels appeared abnormally distinct, and the white substance throughout was of a dull, dirty-gray color. Dr. Meigs remarks, concerning the microscopic appearance of the tissues:—

“I have never before seen a brain presenting such an appearance; it was leaden-colored throughout, as long ago described by Morgagni, who is quoted at length by Frerichs. The hue of the gray matter was most singular. It looked as though it had been washed over with a not very weak solution of India ink. I examined my specimens with the microscope. In every one of these, all the capillaries were unusually distinct, and were crowded with a black pigment in the form of granules, lying in the calibre, or deposited, apparently, in the walls themselves. There existed, also, scattered through the cortical brain substance, isolated grains of pigment much too large to be embraced in a capillary tube. It was evident that the general dark color of the cerebral tissue and substance of the spinal cord was due to the aggregation of these minute grains and granules. Wherever the blood had gone, it had taken the pigment, filling the capillaries, and lodged it in the tissues. To the naked eye, and more particularly, to the eye aided by a pocket lens, the fine vessels of the white medullary matter were everywhere visible, resembling, as Dr. Bright aptly remarks, ‘the appearance produced by scraping the nap of fine cloth on a sheet of white paper.’ The color of the liver was an olive green. The term ‘bronzed liver’ employed by Dr. Thos. Stewardson, in his paper on Bilious Fever, most correctly expresses this appearance.”

According to Frerichs,² sometimes severe brain symptoms, which speedily prove fatal, are developed after only a few hours of vague indisposition, without any distinct febrile symptoms manifesting themselves. In other cases, a simple intermittent fever has existed for weeks or months, when suddenly a severe fit comes on, which often terminates fatally in an instant.

The first case reported agrees almost entirely, in its history and its gross pathological appearances, with that described by Meigs.

¹ Malaria and Malarial Diseases, p. 177.

² Referred to from Sternberg.

In the second case, there was no history of malarial toxæmia, and the man had been a resident of the almshouse since April.

Cases of malarial fever among the physicians and inmates of the asylum, having an origin in the asylum, are not uncommon; but cases of the comatose form *are* uncommon, both in the asylum and in the surrounding country.

It is worthy of notice that a coma of this sort can be mistaken for uræmic coma, especially when the existence of kidney trouble was denoted by an albuminous urine.

That these two cases were cases of malarial coma, the post-mortems leave no doubt. Of especial interest in this connection are the small hyaline masses which were found, particularly in the brain and elsewhere.

Laveran¹ has described certain organisms in the blood and in the tissues of malarial fever patients which lead us to think that he has seen the hyaline masses described by us. He describes these bodies, which he says exist in the blood of all patients sick of malarial fever who have not taken quinine for a long time, when seen under a power of 400 or 500 diameters, as being of three varieties.

Bodies No. 1.—These bodies are elongated, and often curved as a crescent, though some are oval. Their length is 8 to 9 μ , and the width 3 μ ; their contour is very delicate and colorless, except where pigment granules are contained in them. These grains of pigment have often a regular distribution in the mass. In blood treated with osmic acid and preserved in picro-carminate of glycerine, it is seen that these bodies have a double contour, and that the central part stains a rosy color, more pale than the leucocytes in the same preparation. They are without motion.

Body No. 2 is described as an organism which presents a different aspect according as it is in motion or at rest. In a state of repose one sees a body a little larger than a red blood-corpuscle. In the interior of this body the grains of pigment are regularly arranged in a circlet, the pigment appearing as minute black pearls. When in motion, very delicate filaments are seen, which are rapidly moved in every direction, and which are attached to the organism. The length of these filaments is three or four times the diameter of a red blood-corpuscle, and they are three or four in number. Sometimes the filaments become freed from the pigmented body, and continue to move in the blood.

Body No. 3 is described as an organism which is spherical in its primitive form, but great variations in its shape and dimensions are found. It contains pigment, arranged in a circlet, as in No. 2.

He says, besides these bodies Nos. 1, 2, and 3, one finds in the blood small, brilliant, round, mobile bodies without specific characters, and

¹ *Nature Parasitaire des Accidents de l'Impaludisme*, etc. Paris, 1882.

grains of pigment of a fiery red or clear blue color. This blue pigment appears to result from a transformation of the red.

He gives the details of four cases in which the organs were examined after death and in which these pigmented bodies were seen. All of these cases died in coma. The brain was of a chocolate color, and the spleen and liver presented the characteristic appearances. The pigmented bodies were found in every tissue examined. Some, he says, were as large as a leucocyte; most, however, were from one-third to one-fourth that size. He gives various figures of the pigmented bodies, which he thinks are low organisms belonging to the infusoria. At first sight he was inclined to think that they belonged to the amœba, but has given up this idea from seeing the filaments in motion. He thinks the bodies belong to the oscillatoria, and has given them the name of *Oscillatoria Malariae*. That the oscillatoria in general play a certain part in the production of malaria he thinks probable, and cites the case from Schurtz¹ of a man engaged in the study of cryptogams acquiring malarial fever after sleeping in a room filled with oscillatoria.

Kelsch² calls attention to the presence of pigmented bodies in the blood of all patients affected with malarial fever, during the paroxysm, and thinks that their presence or absence should serve as a diagnostic mark. Those bodies described by Kelsch are similar to bodies No. 3 described by Laveran.

From the description which Laveran has given, and from an examination of his plates, it is difficult to avoid the conclusion that the bodies which he has described were leucocytes filled with particles of pigment. The filaments could very well have been threads of fibrin clinging to these. From his figures of the tissues one is led to the same conclusion.

Richard,³ who has made extensive observations of the blood and tissues of malarial patients in the hospital at Phillipville, confirms Laveran's discovery, though his description of the microbe differs considerably from that of Laveran and approaches more nearly to what we have seen. The microbe, he says, has a special habitat, the red corpuscle of the blood, in which it dwells, somewhat as the weevil in a pea. In some cases red corpuscles are met with which have a small round clear pocket, with which exception the corpuscle retains its normal appearance; it is simply *stung*, so to speak. Along with these corpuscles others are seen in which the microbe has reached a more advanced form. In the clear spot, a series of small pigment granules are seen, around which the hæmoglobin, easily recognized by its color, forms a ring which retracts as the parasite increases in volume. Finally a stage is reached when there is only a small colorless margin around the parasite, the hæmoglobin having entirely dis-

¹ Arch. der Heilkunde, 1868.

² Contribution à l'Histoire des Maladies Palustres. Arch. Gén. de Médecine, Oct. 1880.

³ Comp. Rend. Acad. d. Sc. Paris, 1882, xciv. p. 496.

appeared, and the corpuscle being reduced to a small envelope which encircles the parasite. In this form it is identical with body No. 2 described by Laveran. The appearance seen by him in the red corpuscles he thinks represents the first stage in the evolution of the parasite, a stage which escaped the attention of Laveran.

It is evident that Richard has observed the same appearance that we have seen, especially, in the red corpuscles in the brain; and an observation of Herz, in which he avers that he has found nucleated red corpuscles in the blood of malarial fever patients, makes it seem probable that he has seen a similar condition.

In neither of the cases which we have described was an opportunity given for an examination of the blood during life. Examinations of blood were, however, made in several other cases of malarial fever, and negative results were obtained. In one of the cases small round masses, somewhat similar to the hyaline masses which we have described, were found free in the blood. They were, however, not pigmented. They were regarded by us as small masses of protoplasm resulting from the breaking down of white blood-corpuscles.

What is the nature of these hyaline bodies that we have described? Are they organisms of the same nature as those described by Laveran and Richard, or do they result from some metamorphosis of the cells, possibly the red blood-corpuscles under the action of the malarial poison?

There are several facts which would speak rather strongly in favor of their being lower organisms.

The first is their perfect regularity in size and shape. In all cases where they were found, both within and outside of the red blood-corpuscles, they varied but slightly. Certainly not more than individual bacilli or micrococci of the same species would vary. Another strong point is the fact of their staining with the aniline colors. Though the amount of staining they underwent was slight, it was still perfectly apparent.

The red blood-corpuscles, it is true, will stain with some of the red aniline colors, particularly with eosin, and the acid fuchsin used in staining nervous tissues. It is, however, absolutely known that neither Bismarck brown nor gentiana violet has the slightest staining action on them. It is possible that some metamorphosis might take place in the red corpuscles, which would result in a condensation of the hæmoglobin in a small mass. The action of tannin on human blood and of borax on the frog's blood will produce such a condensation in one part of the corpuscle, leaving the remainder perfectly pale; but the condensed hæmoglobin produced by these reagents does not stain with Bismarck brown and gentiana violet.

In our case, in sections of the brain hardened in Müller's fluid, by which the normal color of the corpuscle is to a great extent preserved, it was perfectly apparent that the red corpuscles, even those containing the hyaline

bodies, were not decolorized. Another point is their being found in the brain, *only in the vessels*; where there was a hemorrhage into the substance of the brain they were *not* found in the extravasated blood-corpuscles. Were they due to any action taking place in the corpuscles themselves it is difficult to see why those corpuscles outside of the vessels should not have undergone the same change as those within the vessels.

We are possibly too prone to look to only one class of lower organisms, —the Bacteria,—as the pathogenic factors in infectious diseases.

As Koch has pointed out,¹ it is perfectly just to suppose that we can have other organisms besides bacteria as etiological factors.

On the other hand, there are strong arguments *against* the supposition that these hyaline bodies are living organisms.

They were only found in certain organs of the body, and here, in the vessels; it is difficult to conceive the possibility of an organism existing in the blood and carried as an inert piece of matter in the circulation, being heaped up in the capillaries of one part, as these were in the capillaries of the brain, and not in those of another. Why were they not found in the glomeruli of the kidneys, and in greater numbers in the liver? In the latter, as stated, they were only found in isolated instances in Case I., and not at all in Case II., and yet we know that these organs are especially the ones in which insoluble matters carried with the blood stream are most apt to stick. It can hardly be supposed that an insoluble substance in the blood can have a special affinity for a particular organ and be collected there. They were so small that they could pass readily through any capillary in the body. But if they result from any change in the red corpuscles in a congested area, why were they not met with elsewhere in other congested organs? Numerous other pathogenic organisms have been described by various observers in malarial fever.

Salisbury was about the first to enter upon this field. He described in the blood of persons affected with malarial fever an organism belonging to the unicellular algæ. This he describes as a palmella, and claims to have produced malarial fever in persons by having them sleep in rooms containing fresh earth infested with this organism. These statements of Salisbury have now only a slight historical value; they were never confirmed by any other observers, with the exception of Salisbury's friend and disciple, Ephraim Cutter, of Boston. Lanzi investigated microscopically the flora and fauna of the marshes of the Campagna and the Pontine marshes. He describes a peculiar alteration that the algæ undergo in these localities. Dark granules are found in the endochrome of the cells, which become more and more abundant as the algæ die until they completely fill the cells and give them a black color. In the fall of the year, when the vegetation dies, the microscope reveals the black pigment everywhere in the vegetable

¹ Mittheilungen aus dem Gesundheitsamt, vol. 1.

débris of marshy districts. Lanzi believes that the granules possess the properties of a ferment. They are found abundantly in the dust of the Campagna, and pure cultivations of them in suitable culture media can easily be made. He believes them to be a form of spherobacteria. He thinks the pigment found in the organs is identical with this pigment, and that melanæmia is produced by the heaping up of these granules in the blood.

Afanassieur believes that the small granules of pigment represent a chromogenic bacterium, which is the etiological factor in the production of malarial fevers.

The most important publication, or rather the publication to which the most importance has been given in recent years, is that of Klebs and Tommasi-Crudeli on the "Origin of Malarial Fever." The observers found in the earth of malarial districts certain bacteria, one of which, a bacillus, they supposed to be the essential cause of malarial fever. This organism, which they named the *Bacillus Malariae*, they cultivated, and claimed to have produced the disease in rabbits by inoculation with the pure culture. Sternberg has repeated in every respect the experiments of these authors, and has in no wise confirmed their results, nor have they been confirmed by any other experienced mycologist.

Marchiafava has found the organism described by Klebs and Crudeli in the blood taken from the spleen during a paroxysm.

Still other organisms have been reported as existing either in the ground in regions where malaria is endemic, or in the blood and tissues of the patients; but little weight need be attached to them.

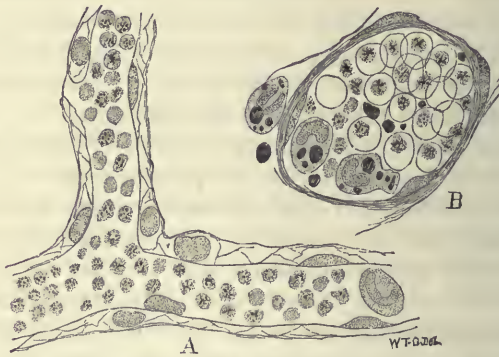
With a view of shedding some light on the subject of lower organisms in malaria, a careful search for the bacilli of Klebs and Tommasi-Crudeli and for any other lower organisms was made in all of the cases of malarial fever which have come under our observation on the post-mortem table. Most of these cases had died of some other disease contracted during or before the malarial attack. Some had certainly died of malarial fever. The organs were taken from the body a few hours only after death, and before any putrefactive changes had taken place. Small pieces of brain, liver, lung, spleen, and kidneys were placed in absolute alcohol, and stained with various reagents and by various methods. No one aniline color was used; most often Bismarck brown, gentian violet, and methylene blue were tried. Sometimes the sections were stained quickly; at others they were exposed to the action of the staining reagents for a considerable time and washed out thoroughly in alcohol. The microscopic examination was made with oil immersion glasses of high power and an Abbey illuminator. In no case were any bacilli, bacteria, or micrococci found. Only in the two comatose cases, which have been fully described, were the singular hyaline bodies found.

Fig. 1.



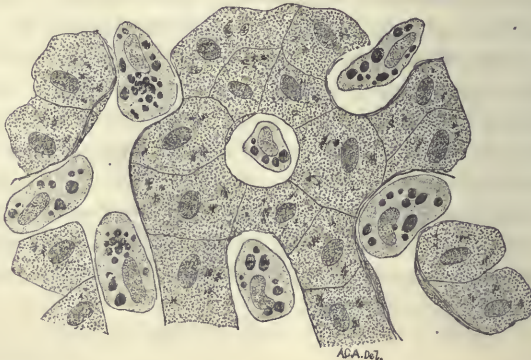
Section of the brain cortex from Case II. The capillaries are seen filled with pigment. $\times 125$.

Fig. 2.



A. Capillary vessel of brain filled with the pigmented hyaline bodies. B. Section of a small vein in the spleen. The hyaline bodies are seen generally inclosed in a red blood-corpuscle. The ordinary black pigment in round masses is seen both free in the vessel and inclosed in two leucocytes. In both the brain and spleen some of the hyaline bodies are seen without pigment. $\times 800$ by $\frac{1}{20}$ oil immersion and slightly reduced.

Fig. 3.



Section of liver from Case I. The beam work of liver tissue is seen, and in the capillaries, the large pale pigmented leucocytes. $\times 500$.

This is another argument against the probability of these being micro-organisms. We cannot suppose the comatose form of malarial poisoning to be a special disease, and were a lower organism found in this, we should also find it in other cases.

We present here the facts only as we have found them; we confess our inability to say what these hyaline bodies are. That they have been seen before by other observers appears most likely.

We hope that the paper will direct attention to the subject in localities where this form of malarial poisoning is more common, and possibly with more material at command, and with more skilful observation, the question will be satisfactorily solved.

ARTICLE X.

OBSERVATIONS ON THE CUTANEOUS AND DEEP REFLEXES. By PHILIP COOMBS KNAPP, A.M., M.D. (Harvard), of Boston.

THE following notes upon the cutaneous and deep reflexes are taken from a series of observations upon 239 persons admitted to the Nervous and Renal Service at the Boston City Hospital, during the latter half of the year 1883. The points noted were the presence or absence of the different reflexes in each patient, a comparison of the reflexes upon the two sides, and a rough estimate of the degree of contraction after the irritation. All the reflexes were tested upon the bare skin, some sharp-pointed instrument—either an æsthesiometer or the point of a pen-knife—being used for the cutaneous reflexes, and a rubber-headed percussion hammer for the deep reflexes.

The cutaneous reflexes examined were the plantar, cremaster, gluteal, abdominal, epigastric, erector spinæ, and scapular.¹ Of these, the plantar reflex was the most constant. In 234 cases it was absent in 17, 10 of which had some direct lesion of the reflex arc, either of the peripheral nerves or of the lumbar cord, six having multiple neuritis, two myelitis affecting the lumbar cord, and two locomotor ataxia. Of the remaining seven cases, three were comatose, two from alcohol, and one from chronic meningitis. The other four will be briefly described as follows:—

CASE I.—Michael M., 49; alcohol to excess; no definite symptoms to be obtained; much mental impairment; general pains and questionable girdle sensation; no evidence of paralysis. In a short time became comatose and died.

CASE II.—Peter M., 58; attacks of vertigo; later, left hemiplegia with contracture; marked mental impairment. In a few weeks became gradually comatose and died. Tumor in corpus callosum.

¹ A description of these reflexes and the method of testing them may be found in W. R. Gowers' *Diagnosis of Diseases of the Spinal Cord*, ed. 1884, pp. 17, 18.

TABLE I.—Cases showing Absence of Plantar Reflex.

N. Normal. o. Absent. n.t. Not Tested. + Increased. — Diminished. R. Right. L. Left.

The numbers are those of the whole series of 239 cases.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.						Deep Reflexes.								
			Cremaster.	Gluteal.	Abdominal.	Epiclastic.	Erector spinae.	Scapular.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrist.	Costal.	Lumbar fascia.	Spine of scapula.
8	Mary F.	Multiple neuritis .	N.T.	N.T.	o.	o.	N.T.	N.T.	o.	o.	o.	o.	o.	o.	o.	N.T.	N.T.
9	John C.	" .	N.	N.T.	o.	o.	N.T.	N.T.	o.	N.T.	o.	o.	o.	o.	o.	N.T.	N.T.
16	Edward M.	" .	o.	N.T.	o.	o.	N.T.	N.T.	o.	o.	o.	o.	o.	o.	o.	N.T.	N.T.
44	Kate C.	" .	N.T.	—	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	N.T.	N.T.
92	Thomas G.	" .	o.	N.	N.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.
190	Mary N.	" .	N.T.	o.	o.	o.	—	o.	o.	o.	N.	N.	o.	o.	N.	o.	o.
143	Abbie K.	Myelitis .	N.T.	N.	o.	N.	o.	o.	o.	o.	—	o.	o.	o.	o.	o.	N.
228	Morsbury J.	" .	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.
119	George T.	Locomotor ataxia .	o.	—	o.	o.	o.	o.	o.	o.	much	o.	o.	o.	o.	o.	o.
200	Joseph M.	" .	N.	o.	N.	N.	o.	o.	o.	o.	—	o.	o.	o.	N.	o.	o.
179	Timothy S.	Alcoholic coma .	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	N.T.	o.	o.
181	Edward H.	" .	o.	N.T.	o.	o.	N.T.	N.T.	o.	o.	—	o.	o.	o.	o.	N.T.	N.T.
149	Mary S.	Chronic meningitis [left hemiplegia].	N.T.	N.T.	o.	o.	N.T.	N.T.	N.	o.	N.	R.— L.O.	o.	o.	R.N.	N.T.	N.T.
57	Michael M.	Meningitis ? .	o.	o.	o.	o.	o.	o.	o.	o.	—	o.	o.	o.	L.O.	o.	N.
71	Peter M.	Cerebral tumor [left hemiplegia]	o.	o.	o.	o.	o.	o.	R.— L.O.	o.	R.— L.N.	R.O.	o.	o.	R.O.	o.	N.
65	John R.	Alcoholism .	N.	o.	o.	o.	o.	o.	N.	o.	N.	L.—	o.	o.	L.N.	o.	o.
102	Sarah M.	Mania, nephritis .	N.T.	o.	o.	o.	o.	o.	o.	o.	—	—	o.	o.	o.	o.	o.

CASE III.—John R., 39; alcohol to excess and exposure to sun. Headache, vertigo, tremor, loss of appetite, insomnia.

CASE IV.—Sarah M., 49; vomiting, headache, slight œdema of feet before entrance. Excited, noisy, and incoherent; refused food; delusions of poisoning. Urine, trace of albumen, hyaline and granular casts. (See Table I.)

In these seven cases, then, there is no clear evidence of a lesion which might act as a direct break in the path of the transmission of the nerve currents, but there is evidence of disturbance of the higher nerve centres. It is a well-known fact that a lesion in one cerebral hemisphere, as a hemorrhage, causing hemiplegia on the opposite side of the body, may, at least temporarily, diminish or abolish the cutaneous reflexes on the paralyzed side, showing that the cerebral disturbance has a direct inhibitory influence. This seems a satisfactory explanation of the absence of the reflex in the first five cases; in the last two the disturbance seems hardly severe enough to have much inhibitory action, yet such an explanation is not impossible, and is the only one I can suggest. In no case, at all events, was it absent where there was not some well-marked disturbance of the nervous system, either a direct lesion of the reflex arc or some cerebral disorder.

The cremaster was second in constancy among the cutaneous reflexes. In 21 cases out of 167 it was absent, and in two cases the cause of its absence was local—extreme œdema of the scrotum, and double hernia with hydrocele. Eight of the other 19 cases had the plantar reflex also absent—two cases of multiple neuritis, one of locomotor ataxia, one of acute myelitis, one of tumor of the brain (Case II.), two of coma, and one of obscure cerebral disease (Case I.). Of the other eleven, one had multiple neuritis, one chronic myelitis, a third meningitis with obscure spinal symptoms and paraparesis, a fourth, with a history of convulsions, had clonic spasms and loss of power in one leg, with some tenderness along the nerve trunks, the fifth was a recent hemiplegia, the sixth was an alcoholic case, delirious, with occasional convulsions later, who had chronic interstitial hepatitis and nephritis, one had uræmic convulsions, three were comatose (two from uræmia and one from alcohol), and the last, an alcoholic subject, had acute pneumonia with slight delirium. (See Table II.)

These cases, then, with a single exception, show either a direct lesion of the reflex arc, or severe disturbance of the higher nerve centres which might inhibit the reflex, even more clearly than the cases where the plantar reflex was absent. The delirium in the case of pneumonia was slight, and does not seem sufficient to explain the absence of the cremaster reflex in that case, yet it was the only nervous disturbance to account for it.

Following the analogy of those cases of hemiplegia which show the cutaneous reflexes absent on the paralyzed side, the absence of the

TABLE II.—Cases showing Absence of Cremaster Reflex.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.						Deep Reflexes.								
			Plantar.	Gluteal.	Abdominal.	Epi-gast-ric.	Erector spine.	Scapular.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrist.	Costal.	Lumbar fascia.	Spine of scapula.
85	Owen M.	Chronic nephritis [œdema scrotum]	N.	N.	—	O.	O.	O.	O.	N.	—	O.	O.	O.	O.	O.	O.
195	John K.	Epilepsy [hernia, etc.]	N.	N.T.	O.	O.	N.T.	O.	O.	N.	—	O.	O.	O.	O.	N.T.	N.T.
16	Edward M.	Multiple neuritis.	O.	N.	N.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.
92	Thomas G.	"	O.	—	O.	O.	O.	O.	O.	O.	N.	O.	O.	O.	O.	O.	O.
119	George T.	Locomotor ataxia	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.
228	Morsbury J.	Myelitis	O.	O.	O.	O.	O.	O.	R.— L.N.	O.	R.— L.N.	O.	O.	O.	R.O.	O.	N.
71	Peter M.	Cerebral tumor [left hemiplegia]	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	L.N.	O.	O.
179	Timothy S.	Alcoholic coma	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	N.T.	O.	O.
181	Edward H.	"	O.	N.T.	O.	O.	N.T.	O.	O.	O.	—	O.	O.	O.	N.T.	N.T.	N.T.
57	Michael M.	Meningitis?	O.	O.	O.	O.	O.	O.	O.	O.	—	O.	O.	O.	O.	—	O.
112	Horace W.	Multiple neuritis.	N.	N.	O.	O.	O.	O.	O.	O.	N.	O.	O.	O.	O.	O.	O.
175	Horace A.	Combined sclerosis [chronic myelitis]	N.	O.	O.	O.	O.	O.	clonus	Slight	+	N.	R.— L.O.	O.	N.	O.	O.
153	William S.	Meningitis?	N.	O.	O.	O.	O.	N.	O.	O.	O.	N.	N.	O.	N.	N.	N.
115	John B.	Epilepsy?	N.	O.	O.	O.	—	O.	O.	O.	O.	N.	N.	O.	N.	O.	O.
230	Robert R.	Right hemiplegia	N.	N.T.	O.	O.	N.T.	N.T.	R.— L.N.	O.	O.	O.	O.	O.	N.	N.T.	N.T.
192	Dwight S.	Alcoholism, etc.	N.	N.	O.	O.	O.	O.	+	O.	O.	N.	N.	O.	N.T.	O.	O.
70	John E.	Uremic convulsions [during attack].	N.	N.T.	O.	O.	N.T.	N.T.	O.	Pre-sent	O.	O.	O.	O.	O.	N.T.	N.T.
73	Michael M.	Uremia [delirious]	N.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.	O.
96	Calvin A.	Alcoholic coma	—	O.	O.	O.	O.	N.	O.	O.	—	O.	O.	O.	N.	O.	O.
189	Michael P.	Uremic coma	N.	N.T.	O.	O.	N.T.	N.T.	O.	O.	O.	O.	O.	O.	N.	N.T.	N.T.
191	Michael A.	Acute pneumonia	N.	O.	O.	O.	O.	N.	O.	O.	—	O.	O.	O.	N.	O.	O.

plantar and cremaster reflexes in so many cases of cerebral disease of one sort or another, where the cord and peripheral nerves were intact, gives additional support to the hypothesis that an irritative lesion in the brain, exciting the inhibitory centres in the basal ganglia and the motor fibres in the pyramidal tract, may inhibit the action of the cells in the gray matter in the cord, and so abolish reflex action.

Although the absence of these reflexes may be thus explained, the observations do not permit the opposite course of reasoning, that, having a lesion in the cord or peripheral nerves, or an irritative lesion in the brain, these reflexes must be absent. Their persistence in locomotor ataxia has long been noticed, and has been explained by Bramwell by the theory that nerve-fibres conducting sensations from the skin pass directly into the posterior cornua, while fibres from the deeper parts, like the tendons, pass through the posterior root zones.¹ The plantar reflex was present in six out of eight cases of locomotor ataxia, the cremaster in seven, the eighth case being a woman. The plantar reflex was seen in two cases of coma where the cremaster was absent, and in nine out of fourteen cases of multiple neuritis; the cremaster was seen in five cases out of eight of the same disease. Their presence, therefore, does not enable one to exclude such diseases, but their absence usually, if not always, implies some nervous disturbance.

The other cutaneous reflexes appeared to be of much less value. The gluteal reflex was third in constancy, but in 179 cases it was absent in 66, and these differed so much as to render deductions from its absence of very little worth. Many of the cases, from the class of diseases admitted to the service, had some nervous trouble, but its absence was seen, not only in hemiplegia, locomotor ataxia, and multiple neuritis, but also in various neuralgias and the localized paralyses of the upper extremity from injury of the circumflex or musculo-spiral nerve, and even in cases of renal or cardiac disease and phthisis, so that it would be unsafe to make any assertions as to the cause of its absence.

The same thing may be said of the abdominal reflex, which was absent in 97 cases out of 239, cases of as varied sorts as those just mentioned.

The result of testing the epigastric reflex, which Gowers claims is singularly uniform, was still more unsatisfactory, for it was absent in more than half the cases, namely, in 142 out of 239.

The cutaneous reflexes of the back, the erector spinæ, and the scapular were of such rare occurrence that the question naturally rose whether their presence might not be pathological. The erector spinæ reflex was present in 45 cases out of 178, but among these cases, besides various nervous diseases, were acute nephritis, hæmatemesis, acute rheumatism, debility, and pneumonia. The scapular reflex was present but 15 times in 177 cases, and these 15 cases again varied so much that no inferences

¹ B. Bramwell, *Diseases of the Spinal Cord*, ed. 1882, p. 111, note.

could be drawn from its presence. One point of some interest, however, was noted in regard to those reflexes, namely, some relation between their presence and that of the corresponding deep reflexes. In 33 cases out of 178 the reflex from the lumbar fascia was present; in 17 of these cases the erector spinæ reflex was also found. In 45 cases out of 178 there was a reflex from the spine of the scapula, and in ten of these the scapular cutaneous reflex was present.

The observations upon the increase or diminution of the cutaneous reflexes seemed to indicate that such a variation was of only moderate value in diagnosis. Such tests as are employed at the bedside are necessarily rough, and the normal standard is only an approximate one which varies with each observer, and variations from this standard cannot be measured with any accuracy. Again, the reflex may vary in intensity in healthy individuals, a slight plantar reflex being no more pathological than a slight patellar reflex, and the intensity is modified by several conditions, like thickness of the plantar epidermis, natural susceptibility to tickling, and even expectant attention. I have repeatedly seen an unexpected prick of the sole of the foot followed by a vigorous contraction of the whole leg, while subsequent pricks gave merely a moderate drawing up of the leg or only a contraction of the toes. A diminution of the reflexes is a thing to be expected in neuritis, in myelitis, or in hemiplegia, and often gives useful information, but an equal feebleness of contraction may be seen in nephritis, dyspepsia, valvular disease of the heart, lumbago, anæmia, phthisis, and pleurisy, so that its value depends upon its relation to other symptoms. Increase of the cutaneous reflexes, too, has not the significance of increase of the deep reflexes, for it was noted in cases of paraplegia and neuritis where the patellar reflex was absent, as well as in myelitis and multiple sclerosis, involving the lateral columns, where the deep reflexes were exaggerated, and also in cases where there was no nervous trouble at all, as in phthisis, nephritis, hepatitis, and in health. As an isolated symptom neither diminution nor increase of the cutaneous reflexes has any significance, but with other symptoms, and especially by comparing the different reflexes with each other, it often gives much information.

If the reflexes differ on the two sides, however, their value in diagnosis is much greater. The plantar reflex differed in ten cases, four of which had hemiplegia, one hemianæsthesia, and one unilateral epilepsy, the reflex being present on the convulsed side and absent on the other. In a case of uræmic convulsions the reflex was absent on one side, but the convulsions were general. It was diminished on one side in a case of reflex paraplegia following cystitis, and in another obscure case of paraplegia, while a similar difference was noted in a case of melancholia with excitement, where the patient's restlessness rendered the examination somewhat untrustworthy.

The cremaster reflex differed in but two cases, one the case of uni-

lateral epilepsy just mentioned, the other an obscure case of spinal disease, probably an irregular form of locomotor ataxia.

The gluteal differed in three cases of hemiplegia, the case of unilateral epilepsy, and a case of chronic myelitis, where the deep reflexes were exaggerated on the side where the gluteal was present.

The cases in which the abdominal and epigastric differed were not all so clearly cases where a unilateral affection could be made out. The abdominal reflex differed in seven cases: one, hemiplegia, the second, an irregular case of locomotor ataxia, the third, unilateral epilepsy, the fourth, left hemiparesis following a fall on the head, where the abdominal and epigastric reflexes were absent on the paretic side, the fifth, cerebral syphilis, with these reflexes increased on one side and the deep reflexes on the other, the sixth, dementia with lead found in the urine, and the seventh, chronic parenchymatous nephritis.

The epigastric reflex differed in five cases, three of which have just been mentioned, hemiparesis, cerebral syphilis, and dementia; the fourth had hemiplegia; the fifth had epilepsy, and was examined after the convulsion was over.

The erector spinæ reflex differed in two cases, multiple sclerosis and hemiplegia.

The scapular reflex differed in three, two hemiplegias and the case of multiple sclerosis, which had marked unilateral symptoms.

In nearly every case, therefore, there was evidence of disease of the brain or cord, either unilateral or more marked upon one side, the chief exceptions being in the cases where the abdominal and epigastric reflexes differed. In one or two cases, notably the case of nephritis, careful examination could not discover a reason for the difference; hence I am not prepared to assert that such a difference is always pathological, but I believe that it is usually a sign of some unilateral disturbance of the nervous system, and that it always demands careful investigation. (See Table III.)

Of much greater interest are the contractions obtained by percussion of tendons, periosteum, and fasciæ—the deep reflexes. Of these, the following were tested: the reflexes from the patellar and triceps tendons and the extensor tendons of the wrist, and the clonuses of the ankle, wrist, and toe; the periosteal reflexes from the tibia, radius, ulna, third costal cartilage, and spine of the scapula; and the reflex from the lumbar fascia. In a few cases where the other tendon reflexes were exaggerated the patellar clonus and the front tap contraction were tested.¹

In all examinations of the deep reflexes that from the patellar tendon from its constancy in health, its value in diagnosis, and the study which has been made of it, is of the first interest. In 47 cases out of 239 this reflex was absent on both sides. It is admitted that in lesions of the

¹ For a full discussion of these reflexes, see J. Ross, *Diseases of the Nervous System*, ed. 1882, vol. i. pp. 140-154, and W. R. Gowers, *op. cit.*, pp. 19-34.

TABLE III.—Cases in which the Reflexes differed.

In this table + and — under ankle clonus and the less frequent reflexes, refer to the intensity of the contraction rather than to any deviation from an imaginary normal standard.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.						Deep Reflexes.									
			Plantar.	Crema-ster.	Gluteal.	Abdomi-nal.	Epigas-tric.	Erector spine.	Scapular.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrists.	Costal.	Lumbar fascia.	Spine of scapula.
2	Richard L.	Myelitis	+	—	o.	o.	o.	o.	+	R.— L.O.	o.	+	+	R.— L.N.	R.— L.—	+	o.	N.
4	Ira H.	Paralysis agitans [left side affected] .	N.	N.	N.T.	o.	o.	N.T.	N.	o.	o.	o.	o.	N.	o.	R.N. L.O.	N.T.	N.T.
5	Martin Q.	Locomotor ataxia	N.	N.	N.T.	—	—	N.T.	R.— L.O.	o.	o.	—	+	o.	o.	—	N.T.	N.T.
13	Lizzie F.	R. hemianæsthesia [hysterical] . .	R.O. L.N.	N.T.	N.T.	N.	N.	N.T.	N.	o.	o.	+	+	o.	o.	o.	N.T.	N.T.
13	Lizzie F.	Right hemiplegia and hemianæsthesia	R.O. L.—	N.T.	R.O. L.—	N.	N.	N.T.	N.	+	o.	R.N. L.silt	+	o.	o.	o.	o.	o.
36	Edward A.	R. hemiplegia	N.	N.	N.T.	N.	N.	N.T.	N.	N.T.	o.	—	+	o.	o.	o.	o.	o.
37	Owen K.	Epilepsy [recovery]	N.	N.	—	N.	R.N. L.O.	o.	o.	N.T.	o.	—	+	o.	o.	R.O. L.—	o.	N.
40	Patrick D.	Spinal concussion	N.	N.	N.T.	N.	N.	o.	N.T.	R.N. L.—	o.	N.T.	N.	N.	—	o.	o.	o.
42	Timothy M.	Right hemiplegia	N.	N.	N.T.	—	o.	N.T.	N.	+	o.	o.	N.	R.— L.O.	o.	—	N.T.	N.T.
45	John F.	Hypochondriasis	N.	N.	N.T.	N.	o.	—	o.	R.— L.N.	o.	o.	N.	N.	—	o.	o.	o.
71	Peter M.	Cerebral tumor [left hemiplegia] .	o.	o.	o.	o.	o.	o.	R.— L.O.	R.— L.N.	o.	o.	R.— L.N.	R.— L.O.	o.	R.O. L.N.	o.	N.
72	Michael G.	Sciatica, right	N.	N.	o.	N.	o.	o.	R.— L.N.	o.	o.	—	+	o.	o.	N.	o.	o.
73	Michael M.	Uremic convulsions	R.N. L.O.	—	N.T.	o.	o.	N.T.	o.	o.	o.	+	+	o.	o.	—	N.T.	N.T.
97	Cornelius C.	Ch. paren. nephritis	N.	+	+	R.N. L.O.	o.	o.	o.	o.	o.	—	+	N.	—	N.	o.	N.
99	Bart H.	R. unilat. epilepsy [during fits] . .	R.N. L.O.	R.N. L.O.	R.N. L.O.	R.— L.O.	o.	o.	o.	+	R.— L.O.	+	+	+	+	o.	N.	R.— L.N.

TABLE III.—Continued.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.							Deep Reflexes.							
			Plantar.	Cremaster.	Gluteal.	Abdominal.	Epigastric.	Erector spinae.	Scapular.								
99	Bart H.	Recovery	N.	N.	N.	N.	R.— L.N.	O.	O.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrists.	Costal.
107	Edwin M.	Multiple sclerosis [1' ft side most affected]	+	N.	O.	N.	N.	R.— L.—	R.— L.—	+	+	+	N.	R.— L.—	R.N. L.O.	O.	R.N. L.O.
109	John T.	Sciatica, right	N.	N.	N.	N.	N.	—	O.	R.— L.N.	O.	O.	N.	—	O.	O.	N.
127	Patrick O.	Meningitis ?	N.	N.	N.	much	much	O.	O.	R.— L.—	O.	O.	R.N.	O.	O.	O.	—
130	Martin C.	Sciatica, right	—	N.	O.	O.	—	O.	O.	R.— L.N.	O.	O.	N.	O.	O.	O.	N.
133	Cyrus C.	Cerebral concussion, left hemiparesis .	N.	N.	O.	R.N. L.O.	R.— L.O.	O.	O.	N.	O.	O.	N.	—	O.	O.	N.
134	Mary D.	Crural neuralgia, left	N.	N.T.	N.	O.	O.	O.	O.	R.N. L.O.	O.	O.	—	N.	O.	N.	—
145	Cornelius F.	L. hemiplegia [embolism]	R.N. L.—	N.	O.	O.	O.	R.N. L.O.	O.	O.	O.	O.	N.	—	O.	O.	N.
148	Theodore B.	Reflex paraplegia	R.— L.—	N.	N.	O.	O.	O.	O.	slight +	O.	O.	N.	—	O.	O.	N.T.
149	Mary S.	Ch. meningitis, left hemiplegia . . .	O.	N.T.	N.T.	O.	O.	N.T.	N.T.	N.	O.	O.	N.	R.— L.O.	O.	O.	R.N. L.O.
150	William C.	Herpes Zoster, right	N.	N.	N.	N.	O.	O.	O.	N.	O.	O.	R.O. L.N.	O.	O.	O.	N.
152	Annie M.	Paraplegia	N.	N.T.	N.	O.	O.	O.	O.	O.	O.	O.	R.O. L.—	—	O.	O.	—
158	Otto W.	L. hemiplegia	R.— L.O.	N.	R.N. L.O.	R.N. L.O.	O.	O.	O.	N.	O.	O.	N.	N.	R.N. L.O.	O.	R.N. L.O.
161	John H.	Chronic myelitis	N.	N.	N.	N.	N.	N.	N.	+	R.— L.O.	O.	N.	N.	N.	—	N.
164	Edward H.	Diabetes mellitus	—	N.	N.	N.	O.	O.	O.	R.— L.O.	O.	O.	N.	N.	O.	O.	N.

TABLE III.—*Concluded.*

Number of observation.	Name.	Disease.	Cutaneous Reflexes.						Deep Reflexes.										
			Plantar.	Cremaster.	Gluteal.	Abdominal.	Epigastric.	Erector spine.	Scapular.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrists.	Costal.	Lumbar fascia.	Spine of scapula.
166	Mary O.	Paraplegia ?	R.N.— L.—	N.T.	O.	O.	O.	O.	O.	R.N.— L.—	O.	O.	R.N.— L.—	O.	O.	O.	O.	O.	N.
168	William E.	R. hemiplegia	R.N.	N.	O.	N.	R.O.— L.	O.	O.	N.	O.	R.— L.O.	R.— L.O.	R.N.— L.O.	R.N.	—	O.	O.	O.
173	Thomas C.	Multiple neuritis	+	—	—	N.	N.	N.	O.	O.	O.	O.	R.— L.O.	O.	O.	N.	O.	O.	N.
175	Horace A.	Combined sclerosis [chronic myelitis]	N.	O.	O.	O.	O.	O.	O.	+	clonus	+	+	R.N.— L.O.	R.— L.O.	N.	O.	O.	O.
176	John L.	Chronic nephritis	N.	N.	N.	O.	O.	O.	O.	N.	O.	O.	O.	N.	O.	N.	—	—	—
185	Mary O.	Melancholia	R.— L.N.	N.T.	N.	N.	—	N.	O.	N.	O.	O.	O.	O.	O.	O.	O.	O.	O.
186	Nathan W.	Cerebral syphilis	—	N.	N.	R.N.— L.—	R.N.— L.—	O.	O.	R.— L.N.	R.— L.O.	O.	—	R.— L.O.	O.	N.	O.	O.	O.
193	Julia H.	Dementia, left hemiplegia ?	—	N.T.	O.	O.	O.	O.	O.	O.	O.	+	—	O.	O.	O.	R.N.— L.O.	O.	O.
194	Michael F.	Combined sclerosis [chronic myelitis]	—	N.	R.O.— L.N.	O.	O.	O.	O.	R.— L.O.	O.	+	+	R.— L.—	O.	N.	O.	O.	O.
201	Thomas M.	Multiple neuritis	N.	N.	O.	N.	N.	N.	N.	O.	O.	O.	—	O.	O.	N.T.	O.	O.	O.
212	Bridget G.	L. hemiplegia	N.	N.T.	R.N.— L.O.	O.	O.	O.	O.	R.— L.O.	O.	O.	N.	N.	N.	O.	O.	O.	O.
221	John M.	Dementia [lead poison]	N.	N.	O.	R.O.— L.N.	R.O.— L.—	O.	O.	R.— L.N.	O.	O.	N.	N.	N.	O.	N.	O.	O.
222	Annie C.	Anæmia	N.	N.T.	N.	O.	O.	O.	O.	N.	O.	O.	R.— L.O.	R.— L.O.	O.	—	O.	O.	O.
224	Mary C.	Apoplexy	N.	N.T.	N.T.	O.	O.	O.	O.	R.— L.N.	O.	O.	O.	O.	O.	N.	N.	N.T.	N.T.
230	Robert R.	Right hemiplegia	N.	O.	N.T.	O.	O.	O.	O.	R.— L.N.	O.	O.	O.	O.	O.	N.	N.	N.T.	N.T.
235	Charles M.	Locomotor ataxia	—	R.O.— L.—	N.	R.— L.N.	O.	O.	O.	O.	O.	O.	N.	N.	N.	O.	O.	O.	N.

reflex arc, as in neuritis, meningitis involving the nerve-roots, locomotor ataxia, myelitis, anterior poliomyelitis, progressive muscular atrophy, and pseudo-hypertrophic muscular paralysis, the patellar reflex may be absent. Hence thirteen cases of multiple neuritis, seven cases of locomotor ataxia, two cases of myelitis, two cases of meningitis, a case of diphtheritic paraplegia, and three cases of paraplegia, or paraparesis of obscure spinal origin, in all of which the patellar reflex was absent, may be dismissed without further comment. In very stout people with short tendons Westphal states¹ that it is very difficult to get the reflex; the difficulty is increased if the legs are œdematous. This may account for the failure to obtain it in three very stout women. Four more were cases of coma, one from uræmia, three from alcohol; in one of these the reflex was well marked on recovery the next day; the others were not tested. The remaining twelve will be briefly described:—

CASE I.—John F., 48. Intercostal neuralgia, probably malarial. Hole in skull, from bullet wound, over second frontal convolution, right. At times convulsive movements of right arm, vertigo, loss of consciousness.

CASE II.—Michael M., 49. Alcohol to excess. No definite symptoms to be obtained; much mental impairment; general pains and questionable girdle sensation; no evidence of paralysis. In a short time became comatose and died. [Case I. under plantar reflex.]

CASE III.—Edward R., 44. Alcohol to excess. Nervous, tremulous, sleepless. Œdema of legs. Albuminuria.

CASE IV.—Terence M., 65. Alcohol to excess. Delirious two weeks. Much mental impairment; gives no intelligent history; complains chiefly of chest. Ocular paresis; hallucinations of sight. Later coma and death.

CASE V.—Michael M., 30. Alcohol to excess. General epileptiform convulsions. No œdema; urine of acute nephritis. Later delirious, hallucinations of vision; coma and death. No reflex in convulsive or delirious stage.

CASE VI.—Dwight S., 35. Alcohol to excess. Delirious and tremulous. Occasional epileptiform convulsion. Albumen, hyaline and granular casts. Liver much enlarged. Reflex not tested in convulsion.

CASE VII.—Cornelius F., 32. Disease of aortic valves. Right hemiplegia 6–7 months before; recovery. Left hemiplegia.

CASE VIII.—Julia H., 60? Much demented. Question of old left hemiplegia. Slight paresis of left side of face.

CASE IX.—Sarah M., 49. Vomiting, headache, slight œdema of feet before entrance. Excited, noisy, and incoherent; refused food; delusions of poisoning. Trace of albumen, hyaline and granular casts. [Case IV. under plantar reflex.]

CASE X.—Jeremiah B., 44. Fell from ladder, striking left hip. Much pain about hip. No evidence of fracture. No pain down leg.

CASE XI.—Ellen W., 35. Facial neuralgia; cancer of breast; systolic murmur at apex of heart. Badly nourished, broken-down, neuropathic subject.

CASE XII.—Michael S., 11. Question of previous scarlatina. Mild acute nephritis, some œdema. No nervous symptoms. (See Table IV.)

¹ C. Westphal, Ueber das Verschwinden und die Localisation des Kniephänomens. Berlin. Klinisch. Wochenschrift, Jan. 3, 10, 1881.

TABLE IV.—Cases showing absence of Patellar Reflex.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.							Deep Reflexes.							
			Plantar.	Cremaster.	Gluteal.	Abdominal.	Epi-gastric.	Rector spinæ.	Scapular.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrist.	Costal.	Lumbar fascicula.	Spine of scapula.
8	Mary F.	Multiple neuritis	o	N.T.	N.T.	o	o	N.T.	N.T.	o	o	o	o	o	o	N.T.	N.T.
9	John C.	"	o	N.	N.T.	o	o	N.T.	N.T.	o	N.T.	o	o	o	o	N.T.	N.T.
16	Edward M.	"	o	o	N.T.	o	o	N.T.	N.T.	o	o	o	o	o	o	N.T.	N.T.
44	Kate C.	"	o	N.T.	—	o	o	o	o	o	o	o	o	o	o	N.T.	N.T.
82	Martha N.	"	o	N.T.	N.T.	o	o	N.T.	N.T.	o	o	o	o	o	o	N.T.	N.T.
92	Thomas G.	"	o	N.	N.	o	o	N.	N.	o	o	o	o	o	o	N.T.	N.T.
95	Thomas H.	"	o	N.	N.	o	o	N.	N.	o	o	o	o	o	o	N.T.	N.T.
111	Mary C.	"	N.	N.T.	o	o	o	o	o	o	o	o	o	o	o	o	o
112	Horace W.	"	N.	N.	o	o	o	o	o	o	o	o	o	o	o	o	o
160	Ida R.	"	N.	N.T.	o	o	o	o	o	o	o	o	o	o	o	o	o
173	Thomas C.	"	slight	—	o	N.	N.	N.	o	o	o	o	R.— L.O.	o	o	o	N.
190	Mary N.	"	+	N.T.	o	o	o	o	o	o	o	o	o	o	o	o	o
215	Bart. J.	"	N.	N.	—	o	o	—	o	o	o	o	o	o	N.	o	o
24	Daniel S.	Locomotor ataxia	N.	N.	N.T.	o	o	N.T.	N.T.	o	o	o	o	o	—	N.T.	N.T.
26	James H.	"	N.T.	N.	N.T.	—	o	o	o	o	o	o	N.	o	N.T.	N.T.	
26	James H.	"	—	N.	o	N.	o	o	o	o	o	o	N.	o	o	o	o
68	Ellen G.	"	N.	N.T.	o	N.	o	o	o	o	o	—	o	o	o	o	o
89	William J.	"	o	N.	o	N.	o	N.	o	o	o	o	o	o	N.	o	o
119	George T.	"	o	N.	—	o	o	o	o	o	o	o	o	o	N.	o	o
200	Joseph M.	"	o	N.	o	N.	N.	N.	o	o	o	o	o	o	o	o	o
235	Charles M.	"	—	R.O.	N.	R.— L.N.	o	o	o	o	o	—	N.	N.	o	o	N.
143	Abbie K.	Myelitis	o	L.N.	N.	L.N.	o	o	o	o	o	o	N.	N.	o	o	N.
228	Morsbury J.	"	o	N.T.	N.	o	o	o	o	o	o	o	o	N.	o	o	N.
10	Martin M.	Meningitis, spinal	o	o	o	o	N.	N.T.	N.T.	o	o	o	o	o	N.T.	N.T.	N.T.
153	William S.	"	N.	N.	o	o	o	N.	N.	o	o	o	o	o	N.	N.	N.

[Return of symptoms 6 months later.]

Finding the patellar reflex absent in every case of coma that was examined, and being led to believe that in one case at least its absence was due to the coma, I naturally was brought to the inquiry whether etherization affected the reflex. The only statement upon the point that I found was that by Horsley that ether and nitrous oxide do not diminish it.¹ I took occasion to test the reflex of a patient that I had etherized to remove a chalazion—a nervous, anæmic man with a well-marked reflex before taking ether—and found that when he was so far etherized that his conjunctival reflex was gone and his limbs were relaxed, the reflex was absent. Being anxious to make further investigations, by the kindness of Dr. Post and the visiting surgeons of the Boston City Hospital, I was permitted to test the patellar reflex in a number of patients before and during etherization. A satisfactory test was made on thirteen adults and four children. In every case the reflex was well marked before etherization, and the second test was made when the conjunctival reflex was lost and the limbs were thoroughly relaxed. In one case there was a very slight increase, in nine cases there was no change, in two cases it was somewhat diminished, and in five, one adult and all the children, it was entirely absent.

Before discussing the cause of the absence of the patellar reflex I will speak of the other changes found in it and of the other deep reflexes of the lower extremity. A diminution of the contraction, although often accompanying some definite lesion of the reflex arc, as in incipient locomotor ataxia or in mild cases of multiple neuritis, is not of much weight, for a very feeble contraction is not inconsistent with perfect health. Absence or marked exaggeration is alone of significance.²

In eight cases the patellar reflex was markedly increased, and in seven it proved a most valuable symptom. Four of the cases had myelitis, one an acute myelitis in the dorsal region, the other three chronic myelitis, probably combined sclerosis of the posterior and lateral columns; one was a case of multiple sclerosis involving the lateral columns; one a case of secondary degeneration of the lateral columns following a tumor of the pons; once it was noted after the convulsions in unilateral epilepsy; and once it was seen in a case of alcoholism, with an obscure history of convulsions, not examined until some hours after admission, and under observation a very short time—a case where all the tendon reflexes were exaggerated, but for which no cause could be assigned in the short time it could be observed.

In cases where the reflex was thus markedly exaggerated an attempt was made to get the patellar clonus, which was found in five cases. Four of these had disease of the lateral columns, two combined sclerosis, one multiple sclerosis, and one secondary degeneration; the fifth had acute

¹ Quoted by W. R. Gowers, *op. cit.*, p. 31.

² J. M. Charcot, *Localization of Cerebral and Spinal Diseases* [Syd. Soc's translation], 1883, p. 25.

rheumatism with endocarditis, and there was a slight and irregular clonus at times on the left side; the patellar reflex and the deep reflexes of the upper extremity were increased on that side. (See Table V.)

In six cases the patellar reflex was absent on one side: a case of incipient locomotor ataxia, a mild case of multiple neuritis, a case of hemiplegia where it was absent on the paralyzed side, a case of severe crural neuralgia following a fall where it was absent on the affected side, a case of diabetes mellitus with pain and prickly feelings in the legs, and a case of dementia with evidence of lead-poisoning. In nine cases it was diminished on one side: three of these were cases of severe and protracted sciatica where it was less on the affected side, one was a case of hemiplegia where it was most marked on the paralyzed side (this case afterward showed contracture and exaggeration of the reflexes on that side), a case of cerebral meningitis, a case of obscure paraplegia, a case of hypochondriasis, a case of recent hemiplegia where it was diminished on the paralyzed side, and a case of apoplexy. In three cases it was increased on one side: a case of hysterical hemiplegia where it was most marked on the paralyzed side, a case of cerebral syphilis where several deep reflexes were increased on the same side, and a case of paraparesis from being trampled on by a horse. In the case of dementia, where no history could be obtained and no trustworthy examination could be made, it is possible that the lead in the system may have affected the cord or the peripheral nerves. With this exception the difference seems pretty well accounted for except in the case of hypochondriasis. (See Table III.)

In 18 cases out of 231 a reflex was obtained from the periosteum of the tibia—a reflex closely allied to that from the patellar tendon, which Schultz considers an indication of the reflex character of tendon phenomena.¹ In five cases it was but slight, and was not attended with any marked exaggeration of the patellar reflex. In eleven cases the patellar was exaggerated, although not always to such a degree as to be pathological, so that its presence seems to be rather of corroborative value as an indication of exaggeration of the deep reflexes than pathognomonic of disease of the lateral columns. In two cases of hemiplegia it was present on the paralyzed side only.

Second in importance to the patellar reflex, though not in frequency, comes ankle clonus. In 12 cases out of 238 it was found on one or both sides, and in every case there was a definite pathological cause. In four cases it was seen temporarily after a convulsion, once in unilateral epilepsy, on the convulsed side only. The other cases gave clear evidence of disease of the lateral columns: three were cases of combined sclerosis of the posterior and lateral columns, one was a case of multiple sclerosis

¹ R. Schultz, Die Bedeutung der Sehnenreflexe, etc., Deutsches Archiv für kl. Medicin, Feb. 14, 1882.

involving the lateral columns, one was an acute myelitis in the dorsal region with probable descending degeneration, one was a case of secondary degeneration following tumor of the pons, one a unilateral degeneration in old hemiplegia, and one a case of cerebral syphilis with unilateral exaggeration of the deep reflexes. (See Table V.)

I regret to say that no regular test was made of front tap contraction. It was present, of course, in the cases of ankle clonus, and in the case of alcoholism where the patellar reflex was exaggerated. It was tested in a few other cases of exaggerated reflexes, but was not obtained. The wrist and toe clonuses were tested in every case, but never found.

Returning now to the cases in which the patellar reflex was absent, it will be remembered that the larger part of them had some lesion of the reflex arc, but that a considerable percentage presented no evidence of such a lesion. The first nine cases quoted at some detail were cases of cerebral disturbance, usually with the history of alcoholic excess. The tenth case may have some spinal disturbance as a result of his fall; the eleventh was one of those patients whose nervous system is wholly worn out, cases in which at times Berger and Bloch found the reflex absent.¹ The cause of its absence in the twelfth case I cannot determine. Perhaps slight disturbances in children may affect the reflex, since all the children examined lost it under ether, but that is a point which demands further investigation.

It has been admitted, and these observations help to confirm the fact, that the cutaneous reflexes may be lost in cases of disease of the higher centres, that is, of the brain. If the knee phenomenon be really a spinal reflex, why may not disease of the brain in like manner diminish or abolish it?

It has long been known that disease of the pyramidal tract in the brain may be followed by a descending degeneration of the lateral columns in the cord, one of the symptoms of which is an exaggeration of the deep reflexes. This degeneration, according to Schiefferdecker's experiments on dogs, does not begin until the fourteenth day at the earliest,² which agrees with the clinical observations that late contracture in hemiplegia comes on from the fifteenth to the thirtieth day, or even later. In cases of direct hemiplegia, as from a hemorrhage in the middle third of the internal capsule, Charcot asserts that ankle clonus on the paralyzed side precedes the contracture, and that exaggeration of the deep reflexes precedes ankle clonus, the exaggeration being valuable as a premonition of contracture, and occurring, perhaps, before there is actual degeneration in the cord.³ In one case of hemiplegia I found that contracture appeared

¹ Dr. Berger, Ueber Sehnenreflexe, *Centralblatt für Nervenhe.* etc., Feb. 15, 1879. See also R. Schultz, art. cit.

² Quoted by J. Ross, op. cit., vol. ii. p. 94.

³ J. M. Charcot, op. cit., p. 248 *et seq.*

TABLE V.—Cases showing Ankle and Patellar Clonus.

The same holds true here as with the cases in Table III. See paragraph at head of that table.

Number of observation.	Name.	Disease.	Cutaneous Reflexes.							Deep Reflexes.						
			Plantar.	Cremaster.	Gluteal.	Abdominal.	Epigastric.	Extensor spine.	Scapular.							
37	Owen K.	Epilepsy	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	Patellar.	Ankle clonus.	Tibial.	Triceps.	Radial.	Ulnar.	Extensors of wrist.
70	John E.	Uræmic convulsions	N.	O.	N.T.	O.	O.	N.T.	N.T.	N ¹	R. + L. +	O.	N.	O.	N.T.	N.T.
202	Robert P.	"	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N ¹	R. + L. +	O.	N.	O.	N.T.	N.T.
99	Bart. H.	R. unilateral epilepsy [during fits]	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	R. + L. +	O.	N.	O.	N.T.	N.T.
107	Edwin M.	Multiple sclerosis [left side most affected]	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	N.T.	R. + L. +	O.	N.	O.	N.T.	N.T.
128	Samuel K.	Tumor of pons	N.	N.	—	O.	O.	O.	O.	R. clonus	Pres.	+	+	+	+	+
175	Horace A.	Combined sclerosis [chronic myelitis]	N.	O.	O.	O.	O.	O.	O.	clonus	—	+	N.	N.	+	O.
194	Michael F.	"	—	N.	R.O.	O.	O.	O.	O.	clonus	R. + L. +	+	N.	O.	O.	O.
2	Richard L.	Dorsal myelitis	+	—	O.	O.	O.	O.	O.	+	R. + L. +	O.	+	N.	N.	N.
161	John H.	Chronic myelitis	N.	N.	N.	N.	N.	N.	N.	+	R. + L. +	O.	N.	N.	N.	N.
168	William E.	R. hemiplegia	R. + L. +	N.	O.	N.	R.O.	O.	O.	R.	R. + L. +	O.	R.	R.	R.	O.
186	Nathan W.	Cerebral syphilis	—	N.	N.	R.N.	R.N.	O.	O.	R. + L. +	R. + L. +	O.	—	R.	O.	O.

¹ On recovery patellar reflex was only slightly marked, two or three days after any convulsion.

some weeks after a difference in the deep reflexes on the two sides was noted; a second case where a like difference was observed was not under observation long enough to notice whether contracture occurred. That such exaggeration is not always due to structural changes in the lateral columns is shown by the occurrence of ankle clonus after epileptiform convulsions, which was first observed by Hughlings Jackson,¹ and later by Gowers, Beevor,² and others,—a phenomenon which I have noticed in four cases of epileptic and epileptiform convulsions arising from various causes. In such cases there can of course be no wasting of nerve-fibres as in sclerosis, and Jackson explains the phenomenon by the hypothesis of an exhaustion of the nerve-fibres in the lateral columns, thereby perhaps causing a loss of control by the cerebrum, the cerebellar influence being unantagonized, or, what he thinks even more probable, there being also an exhaustion of inhibitory centres in the cord itself.³ When this exhaustion extends down so far as to affect the cells in the lumbar centres, instead of an increase of the reflex, it may be lost entirely, as has been noticed by Westphal⁴ and Gowers,⁵ the latter of whom suggests this theory as an explanation. This will account for the absence of the reflex in Case V.

If new disturbances in the brain which either cut off the cerebral influence by a direct lesion, as in hemiplegia, or by an exhaustion of the conducting fibres, as in convulsions, increase the reflex, why may not an irritative lesion of the motor tract, by increasing the activity of the fibres in the lateral columns, inhibit it? That the lateral columns are excitable, though to a less degree than nerves, has been demonstrated by various observers.⁶ Moreover, the patellar reflex has been occasionally found absent by Westphal on the paralyzed side in hemiplegia.⁷ Why may not the absence of the reflex then, in the cases of cerebral disturbance which I have quoted, be due to the over-activity of the lateral columns from some general irritation in the brain? In most of them spinal symptoms were absent, and the cerebral disturbance was the only discoverable cause of the absence of the reflex. The abuse of alcohol may have been a further factor in the causation, but more observations on similar cases must be made before the point can be determined. The theory, at any rate, seems plausible, as a means of explaining the absence of the reflex.

In further support of this hypothesis I will mention one case a little

¹ J. Hughlings Jackson, On a case of temporary left hemiplegia, with foot-clonus and exaggerated knee-phenomenon, after an epileptiform seizure. *Medical Times and Gazette*, Feb. 12, 1881.

² W. R. Gowers, *On Epilepsy, etc.*, ed. 1881, p. 100.

³ J. Hughlings Jackson, Croonian Lectures on the Evolution and Dissolution of the Nervous System. *Lancet*, April 12, 1884.

⁴ C. Westphal, *art. cit.*

⁵ W. R. Gowers, *On Epilepsy*, p. 101.

⁶ J. M. Charcot, *op. cit.*, p. 235.

⁷ C. Westphal, *art. cit.*

more fully. A man was attacked with sudden paraplegia after excessive coitus, and a diagnosis of acute myelitis was made, which was localized in the lower dorsal and the lumbar regions. Two or three days later, when he entered the hospital, the skin reflexes below the epigastric were absent, and there was no patellar reflex. I did not see the case in its later stages, but Dr. Robert Bell, the house physician at the time, told me that six or eight weeks later he had exaggerated patellar reflex, ankle clonus, and much rigidity and muscular spasm in the legs. Supposing that the upper lumbar region with the dorsal was the part diseased, the irritation of the lateral columns in the lower lumbar region from the acute process may have served to inhibit the reflex at the first, but, after descending degeneration had begun, the influences from above may have been checked in their transmission, the inhibition may thus have been cut off, and the symptoms of a lateral sclerosis have arisen.

This does not, however, seem a satisfactory explanation of the absence of patellar reflex in the cases of coma. This I believe to be due to a paralysis of the reflex centre in the cord. Alcohol and probably ether, and perhaps the poison in uræmia, paralyze the least organized, the most complex, the least automatic, the least perfectly reflex centres first—if they did not, as Jackson says, “death from alcohol would be a very common thing”¹—hence, in profound alcoholism it is not strange if the centre for the knee phenomenon is paralyzed before the most perfectly reflex centres, those of the respiration and the circulation.

As regards the deep reflexes of the upper extremity Bramwell asserts that they are seldom, if ever, present in health,² and Ross states that they are obtained under circumstances analogous to those in which the patellar reflex is exaggerated.³ In the cases examined, however, some of these reflexes were generally present.

The triceps reflex proved to be the most constant of the deep reflexes, not even excepting the patellar reflex, it being absent in but 41 cases out of 239. It was absent in nine cases of multiple neuritis, two cases of spinal meningitis, two cases of locomotor ataxia where there was but little impairment of co-ordination in the arms, a case of lead paralysis, and a case of diphtheritic paralysis where the legs were chiefly affected. In 22 cases the patellar reflex was present. The other cases were of various sorts, acute and chronic nephritis, neuralgias in different parts, valvular disease of the heart, debility, alcoholism, dyspepsia, etc., so that its absence would seem to be of no particular significance. It was markedly exaggerated in a case of acute dorsal myelitis, during a convulsion in unilateral epilepsy, and in a case of descending degeneration of the cord

¹ J. Hughlings Jackson, Croonian Lectures on the Evolution and Dissolution of the Nervous System. *Lancet*, March 29, 1884.

² B. Bramwell, *op. cit.*, p. 117.

³ J. Ross, *op. cit.*, vol. i. p. 154.

from tumor of the pons. In five cases it differed on the two sides, in three cases of hemiplegia where it was most marked on the paralyzed side, in a case of obscure paraparesis of spinal origin, and in a case of herpes zoster thoracica, where it was absent on the affected side.

The radial reflex was present in 131 cases out of 239, the ulnar in 61, the reflex from the extensor tendons of the wrist in 25. They were absent in too many cases for it to have any special significance, and, although present in many cases of exaggerated patellar reflex, they also occurred in cases of arthritis, hæmatemesis, valvular disease of the heart, etc., where the nervous system was apparently healthy. Exaggeration, though seen in some cases of disease of the lateral columns, was not noticed in every case, and was also noticed without special nervous disorder.

In twelve cases the radial reflex differed on the two sides, in eleven of which there was disease of the brain, cord, or peripheral nerves, clearly or probably more marked on one side than on the other. In a case of marked anæmia both the radial and ulnar reflexes were present to a slight degree on one side only. In six other cases where the ulnar differed there was disease of the brain or cord most pronounced on one side. The reflex from the extensor tendons differed in a case of hemiplegia, and of dorsal myelitis; it was also absent on one side in a case of chronic nephritis, without nervous symptoms. The wrist clonus was never found.

The deep reflexes from the lumbar fascia and the spine of the scapula are of rare occurrence and of insignificant value. The reflex from the spine of the scapula occurred 45 times in 178 cases, that from the lumbar fascia 33 times. A case of unilateral epilepsy was the only one in which they differed.

The last reflex on the list, that from the third costal cartilage, has been observed more especially in phthisis. When the chest is very fat or œdematous it is, of course, obscured, but it was found in 161 cases out of 234. In ten cases where it was increased, six were cases of general exaggeration of the deep reflexes, and four were cases of phthisis. But nine cases of phthisis were examined, in those it was exaggerated in four, of which three were advanced and one incipient; it was normal in four, of which two were advanced, and it was absent in one, which was complicated with acute nephritis and gangrene of the lung. From so small a number of cases of phthisis no deductions can be made, yet I am disposed to believe that the contraction of the pectoral from percussion of the muscle itself—the muscle, perhaps, being in a more irritable condition in phthisis—has been confused with the true reflex from percussion over the third costal cartilage. The costal reflex differed on the two sides in six cases, all of unilateral cerebral disease, tumor, hemiplegia, meningitis, and epilepsy.

The following tables will show the frequency of absence of the various reflexes :—

Cutaneous Reflexes.

	Cases exam'ed.	Present.	Absent.		Cases exam'ed.	Present.	Absent.
Plantar . .	234	217	17	Epigastric . . .	239	97	142
Cremaster . .	167	146	21	Erector spinæ . .	178	45	133
Gluteal . .	179	113	66	Scapular . . .	177	15	162
Abdominal .	239	142	97				

Deep Reflexes.

	Cases exam'ed.	Present.	Absent.		Cases exam'ed.	Present.	Absent.
Patellar . .	239	192	47	Ulnar	239	61	178
Tibial . . .	231	18	213	Extensors of wrist	239	25	214
Ankle clonus	238	12	226	Wrist clonus . .	239	0	239
Toe clonus .	239	0	239	Costal	234	161	73
Triceps . .	239	198	41	Lumbar fascia .	178	33	145
Radial . . .	239	131	108	Spine of scapula .	178	45	133

From these observations, then, the following conclusions may be drawn :—

1. Absence of the plantar or cremaster reflex is usually pathological, depending upon a direct lesion of the reflex arc or some cerebral disturbance.

2. Absence of the other cutaneous reflexes is not necessarily pathological.

3. Absence of the patellar reflex may be due to cerebral disturbance, especially in alcoholic subjects.

4. Ankle and patellar clonus are pathological.

5. The deep reflexes of the upper extremity are of frequent occurrence, and have no special pathological significance.

6. The costal reflex is found in the majority of cases without general exaggeration of the reflexes, and with no signs of phthisis, incipient or advanced.

7. When the reflexes differ on the two sides, though it usually signifies some unilateral disease of the nervous system, it is not always pathological.

Finally, these observations have led me to emphasize the value of testing all the reflexes, cutaneous and deep, in the upper extremity as well as in the lower, and on the two sides of the body, in examining patients with nervous diseases.

ARTICLE XI.

CATALEPSY IN A CHILD THREE YEARS OLD. By A. JACOBI, M.D., Clinical Professor of Diseases of Children in the College of Physicians and Surgeons of New York.

FANNIE C., aged three years; admitted to Mount Sinai Hospital, New York, September 4, 1879. Some weeks previous to her admission she suffered from headache, for which she was given castor oil. Diarrhœa then set in, and continued; at her admission her pulse was 136, respiration 30, and temperature $103\frac{3}{4}^{\circ}$ F. The tongue was red at its edges; the spleen was enlarged; she had roseola, very slightly tympanites, and diarrhœa. These symptoms of her typhoid fever continued for some time, with a temperature ranging from 105° down to 101° F. She coughed a good deal.

September 10th. It was recognized that she had whooping-cough, and she was removed from the ward.

16th. It was noted that the diarrhœa was better, and on the 17th she was without fever. On the 23d her pulse was stronger, and it was hoped that she would then go on to recovery. On that day, however, a slight spasm of the eyelids was noticed. She coughed but little, but cried a great deal. There were rales with slight dulness at the right apex. At 5 P. M. she urinated quite freely, the twitching continued, and her pulse was 102 and weak. She spoke only a little, but cried a good deal during the next few days.

24th. She had passages which contained some undigested milk. Her appetite was good, and she took milk, soup, egg, etc.

25th. At 10 A. M. there was a good deal of twitching of the lids, and also the eyeballs turned upward, tonically; occasionally there was divergent strabismus; but in the night she slept with her eyes closed.

When the arms were lifted up they would remain in any position in which they were placed. When she was directed, in a loud voice, to drop the arms she would slowly do so. Her legs were in a similar condition, and would remain in the position in which they were placed. The fourth finger, taken separately, remained extended or flexed when placed in either position. The arm could be partly extended, partly flexed with some force, and remained in that position. Still there was some voluntary action left; for, when her arms and hands were in a natural position, she would attempt to take a penny from the bedclothes. Her muscular action in general was very deficient. When she was set up in bed, her head fell forward, and then, again, when the arm was lifted vertically, it would remain in that position for minutes, and then slowly come down. During the last three days she passed a large quantity of urine, with a specific gravity of 1020. Her extremities were very cold, and she was indifferent to everything about her; but when she was aroused by strong impressions, even the twitchings of the eyelids would, for a moment, cease.

27th. The patient was a little stronger, and sat up in bed. She held her head erect while being fed. The twitching of her muscles persisted. When the extremities were placed forcibly in the cataleptic position, reduction was attended with little pain. The lower extremities were less abnormal than the upper ones. She could stand and walk two or three steps.

Sensibility to contact, pain, and temperatures entirely lost. A needle could be run through the skin without eliciting any evidence whatever that it produced pain; tickling the soles of the feet yielded only slight reflex movements; the patella tendon reflex was greatly diminished; her eyes were staring, and her appetite was ravenous.

28th. Easily awakened from sleep; one passage from the bowels; answered questions; anæsthesia and analgesia persistent; conjunctivæ, eyeballs, eyelashes could be touched without giving rise to twitching; sight good; appetite ravenous, and swallowing easy. Pennies occasionally taken from the bedclothes; bowels more constipated than they were yesterday.

29th. Pulse 88; respiration 26; temperature 97° F. Less twitching of the eyelids; patient appeared brighter, but anæsthesia and analgesia persisted, and the arms were strongly cataleptic; appetite continued ravenous; the pupils were equal, and responded to light; the urine was passed in large quantity, and had a specific gravity of 1020.

30th. Pulse 84; respiration 30; temperature 98° F. Two stools; a small ulceration existing upon one arm began to extend; the patient was very cross; the Schneiderian membrane was very sensitive; slight touch produced sneezing.

October 1st. Pulse 92; respiration 22; temperature 99° F. The cataleptic position of arm was sustained one minute; there was no twitching of the eyelids, and the patient appeared brighter; anæsthesia and analgesia remain unchanged. When an arm was flexed a good deal of strength was required to extend it. Urinated once or twice every hour.

2d. Loss of sensation complete; surface of body and extremities warmer, quantity of urine less, and strength of the patient increased.

3d. When an arm was extended or flexed it dropped at once. Reflex movements on pricking with needles.

4th. Pulse 84; temperature 99° F. Four passages from the bowels, for which tinct. opii camphorata was given; anæsthesia and analgesia as before. Four more passages.

6th. Cataleptic position held out one minute. Three passages from the bowels, and opium was increased.

7th. Slept well. Passed a large quantity of urine; slight reflex movements on tickling and pricking the feet. The opium was suspended, and camphor and whiskey given.

8th. Less diarrhœa, and surface warmer. Ulceration on arm looked better. Again Schneiderian membrane and conjunctiva gave reflex movements on tickling.

9th. Patient brighter; anæsthesia and analgesia as before; arm and fingers retained cataleptic position forty-five seconds; urine 1015; no albumen. Pulse 76; respiration 18; and temperature 99° F. A good deal of strength was required, on the part of the attendant, to overcome the cataleptic position while it lasted.

13th. Pulse regular; surface warmer; feet still cold; called for drink frequently, Cataleptic condition unchanged.

14th. Sat in a rocking-chair.

15th. Asked for chamber. On tickling, no reflex; no patella reflex. Cataleptic condition persisted to a slight degree; no twitching of the eyelids.

After this time the general condition of the patient improved, and at about the 20th of October the cataleptic symptoms had entirely disap-

peared. She was still in bed November 5th, but sat up occasionally; her appetite was no longer ravenous; urine less copious.

The child recovered, but remained anæmic and weak longer than patients recovering from typhoid fever are liable to do.

The only case of catalepsy in a child which has come to my notice besides the one reported by me occurred in a boy of thirteen, who suffered from chorea magna during the space of two years before he died in an insane asylum. His attacks of chorea were very violent indeed, interrupted by intervals of several weeks, in which both his convulsive efforts and his psychopathic condition would improve, and would alternate sometimes with brief attacks of catalepsy, with but partial consciousness, diminished or destroyed will power, and the waxy flexibility, all of which symptoms were present in my other case, and are claimed to be those of the morbid condition under consideration.

The literature of the subject in general is by no means inconsiderable, but the cases observed during childhood are but few in number. In his paper, published in Gerhart's *Handb. d. Kinderk.*, vol. v. l. p. 186 *et seq.*, Monti quotes but eleven cases met with in children, male and female in about equal numbers, of from five to fifteen years, the average age being nine years. I know of no case previously reported of a child of three years; in it all the symptoms, psychic indolence, normal or abnormal temperature, cold surface, anæsthesia, analgesia, *flexibilitas cerea*, and diminished patellar reflex (the latter is frequently intact) were found combined. The increase of urine during a good part of the catalepsy was a remarkable feature, such as is seen in hysteria of both adults and children. But while it contained no sugar, and nothing abnormal, except large quantities of phosphates, it had the, in children, unusual spec. grav. of 1015–1020.

ARTICLE XII.

“WRITERS’ CRAMP” AND ITS TREATMENT, WITH THE NOTES OF SEVERAL CASES. By ROBERT PATTERSON ROBINS, M.D., Assistant Demonstrator of Clinical Medicine in the University of Pennsylvania.

THE terms *writers' cramp* and *scriveners' palsy*, with their German and French synonyms (*Schreibekrampf*, *crampe des écrivains*), are good if applied only to penmen, but as the over-movements which are characteristic of the disease have been noticed also in artists, violinists, and pianists, smiths, milkmaids, tailors, and sempstresses, and even in telegraph operators,¹ the names cannot be regarded as sufficiently accurate and

¹ Dr. Poore remarks that these over movements have an analogue in some cases of spasmodic wry neck, and Duchenne has pointed out (*De l'Electrisation Localisée*, 3d ed., p. 1021) an analogy to vision troubles due to prolonged spasm of the internal recti. Dr. C. B. Taylor, of Nottingham, has included in this latter class a form of nystagmus peculiar to miners.

comprehensive. German authors have recognized this, and have from time to time made use of such names as *Schusterkrampf* and *Melkerkrampf* and the like, indicating the craft to which the patient belonged, but this multiplication of synonyms is cumbersome and unsatisfactory, and ought only to be resorted to as a matter of convenience in description. Various terms have also been suggested, embodying theories as to the causation of the disease. Duchenne, for instance, calls these diseases *functional impotences*,¹ and Dr. Poore, who has given much study to the subject, proposes the name *Progressive Functional Ataxy*.² On the other hand, Dr. Zuradelli, of Pavia, writes of them as *irritable weaknesses*.³ So, also, the terms *chronic local fatigue* (Poore⁴), *spasmes professionnelles* (Dally⁵), *co-ordinated business neuroses* (the co-ordinatorische Beschäftigungsneurosen of Benedikt), and other like names are to be met with in the different treatises on the subject. None of them is entirely satisfactory, but, perhaps, in the present state of our knowledge of the disease, that proposed by Dr. Poore (progressive functional ataxy) may be regarded as the best.

It will be inferred from this somewhat formidable array of names that there is some difference of opinion as to the pathology of the disease. Two theories have been suggested to account for these over-movements: (1) that the disease is of centric origin; and (2) that the spasms are caused by the paralysis of certain muscles, and the consequent strong contraction of the antagonizing muscles. Duchenne, Althaus,⁶ and Solly have written quite copiously in support of the first theory. Duchenne (*lib. cit.*) says that these spasms are due to a lesion of some point of the nervous centres, "because (a) the disease is uninfluenced by localized faradization, and (b) because the left hand in cases of writer's cramp is as liable to suffer (should it be used for writing) as was the right one." Mr. Solly, in a very interesting and thoughtful course of lectures,⁷ gives it as his opinion that the lesion is to be found in the spinal cord, and that the disease consists of a granular disintegration of the cervical portion of the cord, whilst Dr. Reynolds⁸ considers the whole trouble to be due to "perverted nutrition of the parts themselves."

On the other hand, Dr. Zuradelli (*loc. cit.*), who has given us one of the most careful treatises upon the subject, is strongly of the opinion that these over-movements "are true spasms, but are due to paralysis of one or the other muscles used in writing, in consequence of which the

¹ De l'Electrisation Localisée, 3d ed. 1872.

² Electricity in Medicine and Surgery, p. 188.

³ Gaz. Med. Ital. Lombardia, No. 36-42. 1857.

⁴ Lib. cit., p. 188.

⁵ Jour. de Thérap. Paris, 1882, ix. 121-131.

⁶ Scriveners' Palsy, London, 1870.

⁷ Lectures on Scriveners' Palsy, Lancet, Lond., Jan. 1865.

Reynolds's System of Medicine, vol. II. pp. 285-292.

antagonizing muscles get the mastery and occasion a spurious cramp." In these views he is supported by the treatises of Geigel,¹ Haupt,² and Meyer.³ Zuradelli discusses very elaborately the various acts necessary in writing, the muscles employed, and most consistently calls these spasms *irritable weaknesses*. He finds in the affected muscles a diminution in tonicity and electric irritability and an intense feeling of fatigue after employment. Mr. Solly (*loc. cit.*), in criticizing this theory, says, "It is not a simple paralysis of muscular power which we have to deal with. The patient can call all his muscles into action; but he cannot bring them into such harmonious action as to be able to write."

Finally Fritz, quoted by Dr. Erb in his treatise on the subject,⁴ advances the hypothesis that "in writers' spasm there is a reflex spasm proceeding from the sensory cutaneous or sensory muscle nerves." I think it probable that, whilst this reflex spasm existed in the case or cases under his observations, there was a coincident centric disease as well.

As to the more specific location of the lesion in the central nervous system, it will be found that most of the writers who hold the first theory are agreed in locating it in the cervical portion of the cord. Erb, however, will not even commit himself to this; he says (*lib. cit.*, p. 355): "In the present state of our knowledge we are justified in placing the seat of the cause of the typical forms of writers' spasm in the central nervous system, although we are not in a position to locate it with precision. Whether the trophic disturbance is to be sought for in the gray substance of the cervical portion of the spinal cord, or in the cerebral peduncles, or, lastly, in the gray substance of the brain, can only be determined by future investigation."

Dr. Stone has reported a curious case which seems to bear directly upon the localization of the writing centres.⁵ It is briefly as follows:—

A prominent English musician had suffered from scriveners' palsy for nine years, during which time he had been treated with temporary alleviation by the use of the continued and induced current. He was also the subject of cardiac disease (mitral systolic murmur) and constitutional gout. He had an attack of cerebral embolism, involving the right side of the body. Upon recovery from this seizure his palsy had disappeared. The agraphia from the palsy had been at times "complete and sufficient to require the aid of an amanuensis; at other times the 'strokes' of the letters, both 'upstrokes' and 'downstrokes,' were regularly serrated with small, vibratory oscillations of a period of about one-fifth or one-sixth of a long-tailed letter." Dr. Stone adds: "My theory as to the etiology of this remarkable case is that the temporary and partial starvation of the writing centre, from obstruction of its blood supply, reduced it from spasmodic and over-excited action to very nearly its normal state; and that, in fact, the two morbid conditions neutralized one another by opposite actions."

¹ Die Schreibekr. u. die functionellen Krämpfe u. Lähmungen, Würzburg Med. Zeitschrift, 1864.

² Ueber die Schreibekrampf., Wiesb. 1860.

³ Z. Ther. des Schreibekr. Verh. d. Berl. Aerzt. Ges. i. 1867.

⁴ Ziemssen's Cycloped. of Pract. of Med., Amer. ed., vol. xi. pp. 345-359.

⁵ St. Thomas's Hospital Reports, vol. xii. pp. 67-75.

Whatever may be the view taken of this interesting and curious case, I am of the opinion that, in the present state of our knowledge on the subject, and in view of the cases reported where the history was strongly against the attributing of the lesion to the periphery, we cannot but accept the theory that the place of the disease is in the central nervous system.¹ As to the more exact localization of the lesion, we must leave it for the present a *res non adjudicata*.

The disease is not apt to occur in early life, being rarely seen in individuals under thirty years of age. I have, however, seen a form of over-movements in writing occurring in a young lady not over three-and-twenty; but in her case the disease was not apparently due to overstrain. As far as I can ascertain, none of the various authors have regarded it as possible that there should exist an hereditary tendency to this neurosis.

The first symptom which will be noticed by the patient is an intense fatigue and stiffness of the fingers, or a sense of sluggishness in the hand, the pen refusing to act as rapidly and as exactly as is its wont. Or, on the other hand, the disease may first introduce itself by the onset of an agonizing cramp of one or other of the muscles of the thumb or forefinger, or of the interossei of the hand. This may often prove a cause of error in diagnosis in the early stages of the disease; indeed, in two of the cases reported by Dr. Solly, the patients thought they had unwittingly sprained the thumb.² If these premonitions of approaching trouble be unheeded, and the disease be allowed to progress, the grasp of the pen will gradually grow less firm, and will have to be reinforced by strong contraction of auxiliary muscles, and even by forcing the pen or pencil upon the paper.³

The first change in the handwriting is a coarsening of the letters and a failure in the approximation of the loops of such letters as the *o* and the *a*. This stage I have invariably noted in those cases which I have had an opportunity to observe, and it is especially to be remarked as prodromal of the paralytic form of the disease. It is unnecessary, I think, to enter into a discussion of the muscles concerned in making the small movements which produce the various strokes, which, when combined, form writing. Zuradelli has done this thoroughly and Dr. Poore elabo-

¹ Dr. Romberg (Manual of the Nervous Diseases of Man, Eng. ed., vol. i. p. 321) says: "Paralysis of the upper extremities, dependent on a cerebral or spinal affection, frequently commences with impaired power of conduction in the motor nerves of the fingers, and consequent difficulty in writing. A man was under my care whose disease lay in the cerebellum, and made its *début* with an impairment in writing."

² Loc. cit.

³ Dr. Reynolds has reported a case (Ib. cit. p. 287) in which "the patient could manage to write a few words by moving only the muscles of the arm and trunk; his pen was directed by the muscles of his back and arm, the latter being pressed closely against his side; but, after a few seconds, spasm occurred in these, the whole body was contracted, the head being drawn downwards to the right shoulder, and the trunk contorted so as to render it concave on the right side."

rately; the curious reader is referred to their treatises. I do not think that it avails much to give particular attention to these minute details, since it is evident even to the most casual observer that no two individuals employ the same methods in writing, and therefore deductions drawn from an analysis of the movements employed by two or three persons cannot be expected to hold good for all or even a majority of the cases. With the progress of the disease the pain or sense of fatigue progresses also from muscle to muscle, until the whole group employed in writing is involved; in one of my patients the deltoid was the seat of pain, and the arm frequently "went to sleep." Occasionally patients notice a feeling of tightness, numbness, or coldness in the hand or arm, and Dr. Reynolds asserts that occasionally there is actual anæsthesia of the fingers.¹ Such are the earliest symptoms of the disease; they are slightly marked only, and are often disregarded, the patient believing that he is affected only by a mild cramp of the arm or fingers, which will pass away before long, and which does not require any specific treatment whatever. The following notes of a case now under my care will illustrate the condition very well:—

CASE I.—Mrs. A., æt. about 40, has been for fourteen years a clerk in a public office. Her duties have consisted in the copying of the written portions of certain set forms, averaging from seven to ten words, on sheets prepared for the purpose. Until the last three years her duties, although arduous, have not been excessive, but of late the business has so much increased that it has often been necessary for her to copy upwards of twelve hundred of these forms during a day of (say) six hours; that is about three a minute, providing she works steadily. Of course this excessive work has not been without its effect upon her. The first symptom of which she took any notice was a sensation of intense fatigue and pain in the thumb and forefinger; these have gradually extended until all the muscles employed in writing, even the deltoid and the pectoralis, have been involved. This sensation usually begins after about an hour and a half of writing, and towards the end of the day a marked cramp of the muscles sets in, so that it is well-nigh impossible for her to hold her pen. At times sensation is almost gone, and it is a common occurrence for her arm to "go to sleep" at night.

I have had an opportunity of comparing specimens of her handwriting, and I find the differences very marked and suggestive. Before this excess of work her penmanship was neat and exact; it is now coarse and rough, the loops of the *o* and *s* rarely meet, and it is indeed more often simply the suggestion of letters than the letters themselves. This is the condition of the patient at the present time. I ought to add that she states that after a month's holiday she always returns to work very materially improved; that there is a marked change in her handwriting, and that the symptoms of fatigue, pain, and anæsthesia entirely disappear.

This case is a very good example of the disease in its incipency, and from this point the disease will develop in one of three directions: it will be either (1) spastic, (2) tremulous, or (3) paralytic.

¹ Lib. cit., p. 288.

(1) In the first of these forms we have the true spasm or over-movement as the prominent symptom, and any of the muscles employed in writing may be affected, either the thumb and forefinger, causing the fingers suddenly to extend and the pen to be dropped; or the "opponens pollicis with abduction and coincident flexion of the index finger, so that the pen is drawn from the paper and moved backwards and forwards in the most irregular manner." Of this nature was a case which came under my notice some months ago:—

CASE II.—Miss B., æt. about 50, slight, nervous and excitable. Family history excellent. About fifteen years ago noticed pain in wrist, which she attributed to over-playing of the piano, and to an incorrect manner of holding the pen. The disease steadily progressed until the over-movements were very marked, not only in writing, but in sewing, knitting, and playing. Under the direction of her physician the arm was rubbed daily with stimulating lotions, was douched with hot and cold water, and for three or four months the faradic current was applied, at first daily, then three or four times a week. No sensible amelioration was produced in the disease, but after she learned to write with her left hand all the over-movements disappeared with the exception of a curious spasmodic contraction of the pronator muscles. This occurred with greater or less frequency, according to the condition of her general health. She also noticed that when writing with her left hand spasmodic movements were excited in her right arm. Her "right arm was always working when she wrote with her left."

In the autumn of 1883 she came under my care, at that time suffering from a severe attack of neurasthenia. She was treated by *rest* and *massage*, and milk and beef-juice. She made a good recovery, and at the same time noted a marked improvement in the over-movements. Though they still persist, it is by no means to so great an extent as before, and this improvement has continued for nearly ten months. She writes, sews, and knits indifferently with her right and left hands, but she asserts that even now, if she sews too long with her right hand, she notices a tingling and partial anæsthesia of the hand, and the over-movements of the pronator muscles become more frequent.

I saw a similar case of over-movement several months ago in a banker of this city. The spasm in his case, however, was in the supinators. He is using now for writing a modification of Velpeau's apparatus, which he says has proved satisfactory.

Zuradelli asserts that, occasionally, if writing be persisted in in spite of the over-movements, the spasm will progress to muscles not especially used in writing; and that sometimes all the muscles of the hand, arm, and shoulder will be affected. In every case, he says, he has found a diminution of muscular tonicity and electric irritability.

(2) The tremulous form of the disease is very well illustrated in the case reported by Dr. Stone and already quoted. In a case which I have seen, and of which I have a specimen of the handwriting, I have counted no less than fourteen curves in the formation of the capital letter T, and thirteen in the letter N.

(3) The third form of spasm is nearly as common as the first, and is directly progressive from the symptoms of pain or fatigue which have been mentioned as an early symptom of the disease; the exhaustion and weakness increase, and finally it is impossible for the patient to write more than three or four words before the muscles absolutely refuse to act.

It is to be remarked that it is generally a characteristic of all the forms of the disease that other co-ordinating muscular actions of the affected part are not followed or complicated by over-movements. The writer can carve, drive, and shave without the occurrence of any spasm; so also the tailor and cobbler can write, the pianist can sew, and the artist can play the violin, without the intimation of any involuntary movement, but let that special and complicated movement which has become the subject of disease be attempted, and over-movements are sure to follow. This rule, however, does not hold in all cases; for instance, Miss B. suffered from over-movements following several coördinative muscular acts, and Dr. Poore has reported two cases¹ in which carving, writing, shaving, and driving were all complicated by over-movements.

Enough has been said with regard to the symptoms of this disease to make the *diagnosis* easy. The *prognosis* should always be guarded. But when an uncomplicated case of scriveners' palsy is taken early enough, say in the first stage, or even before the second stage is well advanced, and when absolute rest can be secured, and when finally there exists in the affected muscles some faradic irritability, I see no reason why such a case should not recover. On the other hand, the scores of cases which have come out from treatment only temporarily relieved warn us that we should be wary of rashly promising absolute recovery. Dr. Poore, indeed, reports a case² which had lasted for ten years, in which there were marked pain and over-movement, and in which there was ultimate recovery after a six months' treatment, consisting of absolute rest, galvanism, and nervines. Such a recovery, however, must be regarded as entirely exceptional.

Now, given a patient in whom these over-movements exist, what should be the treatment? In the first place, there is one absolutely essential factor in the treatment of all cases in which recovery is hoped for, and that is *absolute rest*. No case can possibly improve to any great extent without it. By *rest* is meant entire cessation from all those coördinative movements which are attended with pain, fatigue, or spasm. For other movements the arm may be used, but the writer must lay aside his pen, the violinist his instrument, and the seamstress her needle, during the whole period of treatment. In order to insure restoration I have in one or two cases ordered the arm to be carried in a sling during the first week of treatment. If there be any atrophy of the muscles, stimulating

¹ Lib. cit., p. 219.

² Practitioner, London, Sept. 1872.

lotions, with rapid *friction*, may be employed; and I have seen good effects follow alternate *douching* with hot and cold water. *Calisthenics* have also been suggested, and may be approved if addressed especially to the affected muscles.

Massage in cases of over-movement was first suggested by Wolff, and his results and method were published by Vigouroux¹ in 1882. Briefly, his method "rests exclusively upon active and passive gymnastics of the fore and upper arm, upon massage, percussion, and friction of the same parts, and after a time elementary exercises in writing prescribed and adapted to each case by holding the pen in a definite manner. These are gone through with two or three times daily for half an hour or so at a time."² It is claimed that by this method Wolff cured 157, improved 22, and effected no change in 98, out of 277 cases of over-movement. The duration of treatment averaged three weeks. Massage has an earnest advocate in Dr. Douglas Graham, of Boston, who has recently published a treatise³ in which he strongly endorses the treatment of over-movements by massage.

Finally, in *electricity* we have a most important factor in the treatment of these neuroses, although the experience of Zuradelli and others would seem to indicate that good results are not to be expected in the majority of cases when reliance is placed chiefly upon the battery. Dr. Poore, in his excellent hand-book already mentioned, points out the fact that almost all these failures have followed the use of the faradic current. In his hands the use of the continuous current has generally been followed by improvement, and he strongly advises against the use of the faradic current as being too powerful a stimulant, and carrying with it the danger of extinguishing the faint spark of electric irritability which may remain in the worn-out muscle. His method of using the continuous current is as follows:—⁴

"One pole (the positive) is placed, let us say, in the axilla, and the other over the ulnar nerve just where it leaves the biceps muscle *en route* for the olecranon. The strength of the current is short of that which causes muscular contraction, but is just sufficient to make the patient conscious of a tingle in the end of the little finger when the circuit is made or broken. The patient is made to exercise the interossei by separating and approximating the fingers rhythmically. Take another example: the positive pole may be placed over the median nerve at the inner border of the biceps, and the negative over the body of the flex or longus pollicis, while the patient is made to flex rhythmically the distal phalanx of his thumb; or, again, the positive pole may be placed in the axilla, and the negative over the musculo-spiral nerve as it turns forward alongside the supinator longus just above the bend of the elbow; and the patient is then made to supinate the hand or extend the finger rhythmically."

¹ Progrès Méd., Paris, Jan. 21, 1882.

² Th. Stein, Berlin. Klin. Wochen., Aug. 21, 1882.

³ A Practical Treatise on Massage, etc. New York, 1884.

⁴ Electricity in Medicine and Surgery, p. 204.

Professor Erb, consistently with his theory as to the pathology of the disease, favors applications of the continuous current to the entire motor apparatus from the cerebral cortex to the muscles." He also advised local faradization with strong currents.¹

I add the report of a case treated in accordance with the method which I have tried to suggest in these notes :—

CASE III.—Mr. B. aged 36, small, wiry, of neurotic temperament and family history. A sister has hysteria, and has had several attacks of hystero-epilepsy, and his half brother is epileptic. Has been a book-keeper with the same firm for over fifteen years. Two years ago, after a great stress of work extending over several weeks, he noticed symptoms of fatigue and pain after writing for an hour or so. The disease progressed rapidly until finally he was forced to hold the pen between his fingers by forcing it on the paper, and by strong muscular contraction. The disease finally advanced to the second stage, and over-movements began. After writing a few minutes the thumb and fingers would be suddenly jerked apart, and the pen would fall between them. He became seriously alarmed, and consulted a physician, who advised rest and electricity. He took a month's holiday and went under treatment; was faradized three times a week, but, as far as I can learn, upon no particular system. At the end of his holiday he was somewhat improved, and returned to his work considerably encouraged, but after a month and a half, although he was careful not to do more writing than was positively necessary, he found his old condition gradually returning. After struggling with the disease for several months longer, he came under my care.

The case was not a promising one. The faradic irritability of the muscles of the right hand and arm was considerably diminished; the man himself was anæmic and nervous. I insisted upon entire rest, not only for the affected arm but also for the whole body, and to this end I ordered him to bed, and put him on a modification of the Weir Mitchell Treatment for Neurasthenia, including massage four times a week especially directed to the affected arm, and the constant current applied daily. After the first week I allowed him to leave his bed, applied the battery daily, and continued the massage. At the end of the first fortnight the improvement of the patient was so marked as to cause me some astonishment. He had a voracious appetite, had gained sixteen pounds in weight, and his nervousness and insomnia had vanished. The faradic irritability of the muscles of the right arm was considerably increased. Without going into the details of the history, I will add that I continued this method of treatment, gradually diminishing the number of *séances* both of electricity and of massage, until at the expiration of the third month I discharged the patient practically well; though I must say that his handwriting was still coarse and ill-formed. He has had no return of the disease, but he has given up his occupation as a scrivener.

This is a good instance of recovery in a case in which all the conditions for treatment are favorable, but the practitioner will often meet with cases in which it will be impossible for the patient, whose livelihood depends upon the pen, to give up, even for a short time, the employment which

¹ Hand-book of Electro-Therapeutics, Amer. ed., pp. 296, 297.

has induced the disease. In such cases the prognosis for recovery is of course unfavorable. Writing may, of course, be made possible by the employment of some apparatus for holding the pen and relieving the affected muscles. Many of these appliances have been invented; amongst others may be mentioned those of Cazenave, Langenbeck, and Velpeau. One which was suggested by Von Nussbaum, of Vienna, seems to me to possess to a greater degree than the rest the advantages of lightness and simplicity. It consists of an oval band of hard rubber through which the fingers pass, and which is held in position by the pressure of the ball of the thumb. On the upper part of this band is fastened, by its base, a grooved right-angled triangle sloping towards the fingers. In the groove the penholder is held by a screw. Writing with this instrument is entirely from the wrist, there being no finger movements, and the hand must be held in complete pronation.

One of my patients derived much benefit by alternating with the ordinary penholder a little apparatus which was made of an ordinary solid rubber ball; this was perforated at about one-third of its circumference, and a penholder was thrust through. The ball was held in the hand, and the penholder passed up between the first and second fingers.

It will be evident, however, from what has been said, that these apparatuses can only be used in cases where the mischief is confined to the muscles of the hands and fingers. If the pronators and supinators be also involved, the contrivances will, of course, be useless. And, indeed, in the majority of cases, the practitioner must be very guarded in recommending any of them as likely to be of more than temporary benefit.

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ARTICLE XIII.

A CORRELATION THEORY OF COLOR-PERCEPTION. By CHARLES A. OLIVER, A.M., M.D., one of the Ophthalmic and Aural Surgeons to St. Mary's Hospital, Philadelphia.

IN an article upon this subject, which was published in the preceding number of this Journal, the correlation theory of perception and the sup-

port it received from physiological research was discussed. In the present paper we propose to still further test its correctness by the pathological data at our command.

PATHOLOGICAL DATA.—Here, where the degree of vitality of lowered sensory material is made evident by the study of correspondingly faulty results of physiological power, positive proofs as to the genuineness of the supposed character of the normal working machinery, and of its probable mode of action, can be thus indirectly obtained. This can best be done by study of the condition known as “color-blindness.” From time immemorial it has been known, but not until quite recently has its presence been tested for, as a means of diagnosis in those still obscure changes which give rise to its existence. Numerous fragmentary accounts of imperfectly observed varieties could be cited, where, although symptomatic facts stood staring the observer in his face, yet on account of the rarity of proper instruments of detection, and by reason of the primitiveness of the current methods of precision, the observations were of such little value as to render them mere curiosities to the present student. For these reasons it has not been deemed necessary to spend any time in their relation.

When the great disproportion between the vast number of “natural colors” and the limited amount of “sensory colors” is considered, the conclusion that must be logically drawn is, that, normally, every visual mechanism is physically and physiologically fitted to respond to but a small amount of the great bulk of natural color vibrations, thus virtually proving that every such mechanism is truly “color-blind.” Guillemin says¹ that M. Chevreul was able to distinguish and designate fourteen thousand four hundred and twenty “tones” of color. At first sight, this seems wonderful—wonderful because it is exceptional, and yet even in this instance, the thought arises, how many billions of color differences there were still to perceive, and how meagre the vaunted attainments of the imperfect color-seeing organ! The fact that there is a limit for color-perception can be explained by comparison with the physiological powers of one of the lower senses. Helmholtz,² by a series of experiments, has fixed the lowest limit of natural vibratory tone which is perceptible to the auditory apparatus of the human species, as one of about sixteen vibrations to the second,³ and the highest at a little more than thirty-eight thousand vibrations per second: this latter number, as shown by Turnbull,⁴ is about the limit for the ordinary untrained human ear, although,

¹ “The Forces of Nature,” etc. Eng. translation by Mrs. Norman Lockyer, 1873.

² “Die Lehre von den Tonempfindungen,” etc., 1870.

³ Savart placed the deepest perceptible tone at a point equivalent to but eight complete vibrations in a second’s time.

⁴ Journal of the American Medical Association, Nov. 29, 1884, p. 591. (Turnbull really estimated a fraction over forty thousand, as the average result for the normal and healthy auditory apparatus.)

in one instance cited, a tone of sixty thousand natural vibrations to the second was perceptible. Even granting that the most distant extremes recorded are correct, yet even here the proportion in numbers between sensible sound and natural sound is so exceedingly great, that the amount of each is in no degree comparable. These results with a lower sensory organ show that similar limits of physiological action from imperfect mechanism must be expected from the higher sense—vision. Moreover, the human visual apparatus as it now exists, through inherent want of adequate working machinery, is unable to receive for perception every grade of natural color impression existing between the usually recognized terminals (red and violet) of ordinary spectra. All that has been said in reference to the low value of Chevreul's seeming great ability of color differentiation can be applied here just as well as in the other argument. Billions of unrecognized natural color-differences exist between the red and the violet ends of the ordinary solar spectrum, colors that, through want of power of receipt, transmission, and perception, may forever remain unknown. Examples in support of this, based upon "sound-deafness,"¹ may be given. Wollaston mentions² that certain individuals who possess a sensitive ear for low sounds are often unable to recognize very acute sounds. He says that frequently for such persons, the chirp of the grasshopper and the cry of the bat are inaudible, and cites one case where the chirrup of the common house sparrow was not heard at all. He instances a personal failure in recognizing the cry of an unknown species of gryllus, which was distinctly heard by some young friends. Herschel writes: "Nothing can be more surprising than to see two persons, neither of them deaf, the one complaining of the penetrating shrillness of a sound, while the other maintains there is no sound at all."³ Tyndall speaks of an instance which occurred in his own life,⁴ when crossing the Wengern Alp in company with a friend. He says: "The grass at each side of the path swarmed with insects which to me rent the air with their shrill chirruping. My friend heard nothing of this, the insect-music lying quite beyond his limit of audition."⁵ Reasoning from these examples of inadequacy in the action of a lower sense shows conclusively that each normal human color-seeing organ of the present type has a certain innate physical inability which prevents the perception of every spectral color. In support

¹ An imperfect term comparable with "color-blindness," first made use of by the author, in the Phila. Med. Times, Jan. 28, 1882.

² Philos. Trans., 1820, p. 306 *et seq.*

³ Tyndall on "Sounds, etc.," p. 73.

⁴ *Ibid.*, p. 73.

⁵ In these citations it is impossible to say how much of the peculiar conditions was due to acquired pathological change, but it is evident, from the manner of observation and the purpose of the observer, that they are most probably illustrative of normal idiosyncrasy. Individual experience has contributed to the author's mind at least that there are many such cases to be found in our everyday existence.

of this, Pereira remarks:¹ "It is highly probable, however, that the range of human vision, like that of hearing, is subject to variation in different individuals." He broadly asserts that "there is a limit to the sensibility of both ear and eye," which statement he makes fuller by saying "that is, a certain number of impulses must be made in a given time on these organs; and if we go on augmenting the number, we cease to be sensible of them after a certain time." Superadded to this want of capability of certain sensory elements to be more freely acted upon, there is another factor which is dependent upon individual lack of training and want of education, *i. e.*, a true deficiency of functional activity. This should not be confounded with the former, as this latter factor is merely a want of physiological action, and has no practical bearing upon the subject. It partly solves the riddle why the percentage of deficient color-sense is so much lower in the female sex than it is in the male sex. Independent of the fact, based upon the still vague laws of heredity, especially as exemplified by the transmission of imperfect material for color-vision, that congenital defects are most generally brought forward in succeeding lines of generation by unattacked females giving birth to diseased sons, women will differentiate colored materials more accurately as long as the female lines of generation shall continue to live amongst natural colors, and men need never hope to attain so good a system of grading until the choice and selection of such colors shall become a similar routine duty. It is an incontrovertible fact that if any proportion of a number of similar visual apparatuses should be reared amongst colors, they would give far better results in color-perception than those not so happily situated: this can be illustrated by the ability of the *male* operatives of a large dental depot in this city to tell at a glance the trade number of a tint of enamel in a set of artificial teeth from more than fifty varieties. Skilful musicians have by long practice enabled themselves to enjoy musical sounds which are wholly ignored by less trained auditory apparatuses. Education and experience have created or brought into activity other correlated perceptive elements of hearing that have either been newly made or have for a long time remained dormant and unused. To aver that a person whose color-perception material is not trained to detect delicate differences of color, is physically "color-blind," would be as ridiculous as to declare that an uneducated and unused muscle is incapable of proper action if correct stimulus should be regularly and periodically applied.² Every normal color apparatus has an idiocratic and definite amount of fault in color-perception, dependent upon two separate factors. First, a physical incapability; and, secondly, a want of physiological action. The first factor should be subdivided into two conditions, in one of which there is a limit

¹ Lectures on Polarized Light, etc., by Jonathan Pereira, 1854, p. 80.

² Phila. Med. Times, Jan. 28, 1882, pp. 282-285.

in the extent of the visible or human color spectrum,¹ and in the other where there are breaks or hiatuses in this visible color spectrum; both conditions being caused by either the primary want of proper physical material, or the subsequent loss of responsive nerve-substance through disuse. The second factor is called into play either when there never has been a presentation of the natural color-stimulus, or where the physiological action has been so slight (either in amount or duration) as to give but a faint and improper perception.

If the assumption be true that each individual in the human species has a definite amount of the so-called "color-blindness," then it remains only to find those cases in which the condition becomes so marked as to assume the character of recognizable fault. At this latter point, the usual signification of the popular definition of "color-blindness" has been reached, and the faulty color-seeing organ must be placed on the pathological side of the question. So arbitrary is this point, so different are the acceptances of authoritative reasoning as to the choice of its position, and so limited are the means for discrimination, and crude the data for average normalization, that it becomes impossible at the present time to give any positive basis upon which to place the abnormality. All that can be said is, that, if there either should arise a noticeable defect in color-vision during the life of a visual apparatus, or if there should be a recognizable similar condition which has manifested itself from the first use of the working material of the apparatus, then the individual may be designated as one with lowered color-vision; the recognition of the fault being entirely dependent upon the amount and degree of the affection, coupled with the discriminating powers of the observer and the possessor.

The many euphonious Greek coinages should all be discontinued, because it is difficult to obtain one that is sufficient to express the exact condition of affairs. If foreign technical expressions are desired, then a newly coined term, "Hypochromatopsia," as expressive of lowered color vision, may be employed, as being probably the best for a general descriptive term for the different varieties of the affection, throughout the entire color-seeing world. Its use in this connection is legitimate and proper, if the word "Chromatopsia," of similar Greek origin, be assumed as its normal equivalent. When the human species is reached, there should be a distinctive and recognized difference employed, and this may be best accomplished by the addition of "Anthropo" (from the Greek root signifying "man") to each of the coinages, thus making two extremely long and cumbersome words "Anthropochromatopsia," and "Hypoanthropochromatopsia," both of which can be avoided by the use of the far better English expressions, "Normal human color-per-

¹ A term indicating a theoretical spectrum which might be mentally produced by adding together and placing in a spectral line all of the individual natural colors which have been perceived by a normal color-perception apparatus.

ception," and "Subnormal human color-perception."¹ The well-known word Chromatopsendopsie is very old, having been used by Sommer² in 1823, and Trichinetti³ in 1844. In 1853, Wilson modified it into "Chromatopsendopsis,"⁴ whilst Noël,⁵ in 1857, returned to the use of the original term. The very undesirable name "Daltonism"⁶ is just as ridiculous and as inexpressive of its intended signification as "Bright's Disease," "Grave's Disease," "Pott's Disease," etc., each of these names not indicating in any way a single point towards the character of the disease, nor giving an iota of information in reference to the situation of the trouble. When such expressions as "Achromatopsia," "Color-Blindness," "Farbenblindheit," "Cécité des Couleurs," etc.⁷ (which according to this theory signify an absolute loss of the sensory power of the individual filaments of the optic nerve)⁸ are employed as terms significant of impaired color-vision, they can be set down as improper, because they can only be appropriate in cases of absolute loss of power of the sensory filament, *i. e.*, true blindness.

Taking the healthy human visual apparatus as a standard, it may be considered to possess what may be termed "normal human color-perception." This term should not be thought to express perfect color-perception, as it indicates merely the sum total of the average value of the working powers of the normal visual sensory nerve-tissue of man. The moment that a human color-seeing apparatus has been found to be below the average—under the normal—then it can be said to possess "subnormal color-perception." This term is expressive of an absolute condition. It shows one of three things—that a color apparatus has been imperfectly developed, or that either a properly formed material or a badly developed structure is lowered in its vitality through disease or injury. It does not say that there is "difficult color-perception" (Dyschromatopsia),⁹ which

¹ This new application of the word "subnormal," which is an extensively employed term in geometry, is to the author's mind perfectly legitimate in this connection.

² "Ueber Chromatopsendopsie, etc.," Jour. d. Chir. u. Augenh., 1823.

³ "Chromatopsendopsis," Ann. Univer. de Méd., No. I, 1844.

⁴ "Researches on Color-Blindness," etc., George Wilson, 1855.

⁵ "De la Chromatopsendopsie," Thèse de Paris, No. 203, 1857.

⁶ A term introduced in 1827 by Pierre Prévost of Geneva.

⁷ Used by Brewster, Pole, Découdé, Cunier, Eichmann, Clemens, etc.

⁸ As has been explained in the previous paper, the sole office of the individual sensory filament of the optic nerve is for color-perception. *Form* is produced by different degrees of coetaneous sensory actions from many proximately placed optic-nerve filaments, associated with other perceptions and conceptions, both previously and simultaneously obtained. *Light* to be seen must be colored. As has also been shown, pure *white* is a compound color caused by the simultaneous reflection in a definite direction of any two pure complementary colors, or of any even multiple of pure complementary colors from an impinging natural object; its visible expression being nothing but the result of a compound impression of color.

⁹ Recently this term has been employed to signify what has been termed "Lowered Color-Sense."

only shows a difficulty in work or result, not expressing whether the answer is correct or not. It does away with the faulty expression "false color-perception" (Pseudo-chromatopsia), a term which fails to give a better impression than a vague idea of incorrectness. Further, it accomplishes more than the term "abnormal color-perception,"¹ because even here, in this more accurate expression, the implied signification is not sufficiently comprehensive: it states that there is a departure from normal color-perception, but fails to tell whether it is for the better or for the worse, and as the true condition of affairs is one of lowered color-sense, the term as written is inadequate.

There have been many suggestions as to the naming of the different varieties of subnormal color-perception, names that have been employed with the hope of giving a clue to the kind of defect, and to its amount. Some authors have based their nomenclature upon the colors seen. Hays gave five definite conclusions upon this plan.²

By this method, Mauthner obtains the following terms. "Erythrochlo-ropisie" (red-green seeing), and "Xanthokyanopie" (yellow-blue seeing).³ Other writers, such as Wilson,⁴ Holmgren,⁵ etc., obtain their namings from the imperceptible color or colors.

Careful analyses of most of the proclaimed different kinds of "color-blindness" have often made evident that the observer, in his endeavors to explain certain groupings of intelligently expressed subjective symptoms, or to give answer to almost self-determinate physical changes, has been so hampered in his studies through want of minute research and carelessness of observation, that totally false and incorrect classifications have arisen from inadequate data drawn from faulty conclusions. All this can be avoided through careful and conscientious study of clinical facts, and by remembering and bringing into play the intimate relations of expressed results existing between the correlations of inanimate and animate physical forces. Strictly, there cannot be given any exact kinds of subnormal color-perception. As was explained, when speaking of the incapability of obtaining any scientific basis upon which to place the error in its totality, so here the same predicament is met the moment that definable positions of separation for the different amounts of individual fault are

¹ Suggested by Burnett, Amer. Jour. Med. Sci., July, 1884. On page 240 of Dr. Wm. C. Henry's biography of John Dalton, published in 1854, George Wilson uses the following words in connection with his choice of the term "False Vision of Colors"—"a term sufficiently general to include all the varieties of *abnormal color vision* (italics ours) without committing its employer to any theory as to their cause."

² Report of Cases treated in the Wills Hospital for the Blind and Lame, etc. By Isaac Hays, M.D. The Amer. Journ. of the Med. Sciences, Aug. 1840.

³ Vortraege d. Augenheilkunde, 1879, Hft. iv.

⁴ Researches on Color-Blindness, 1855.

⁵ De la Cécité des Couleurs dans ses Rapports avec les Chemins de Fer et la Marine, 1877.

attempted. Every color-perception apparatus has its peculiar amount of power—even more; each component filament has its separate strength, and what might be an error in one sensory avenue, may be the normal power of another sensory channel. From the past experiments, it is certain that those optic nerve fibrils which terminate externally in the macular region of the ocular retina are the ones of highest physical and physiological evolution. They and their allied extensions represent the highest forms of evolutionized machinery, and they hold the acme of sensory life force destined for the conversion of natural color into correlated perceptions. As was also seen, those optic nerve filaments of the most distant circummacular regions of the same ocular retina gave but minimum results as compared with their more fortunately placed co-laborers in the macular regions, showing that the peripherally situated fibrils were of inferior mould, and of lower sensory life-force. Each individual optic nerve filament has a definite receiving power dependent upon its innate physical development combined with all that acquired growth which has been the result of physiological work and exercise. How beautifully correlated are the “tactile corpuscles”¹ of the finger tips to the optic nerve endings in the macular region of the ocular retina! How like the furthestmost limits of the circummacular regions of the ocular retina are the feebly responsible tactile terminals of the dorsal regions of the skin!² If an injury should happen to the optic nerve in its entire external spreading, or disease invade the whole integumentary expansion of the tactile nerves, so as to affect their peripheral distributions equally, both the subjective and objective symptoms arising in the various situations of each of these sensory forms would depend upon the individual physical character and physiological power of the fibre in the attacked region. While it is undoubtedly true that the symptoms derived from such a character of cause would be so totally unlike, and individually so differently graded in seriousness of result, that no determinate value could be placed upon the amount of the injury or disease, by studies confined to an individual set of fibres, yet in the different distributions of the optic nerve fibres, there is such a correlation of structure and power, that intelligent study of physiological research to determine the efficacy of the normal action of these several situations, united with proper interpretations of the visible expressions of pathological change taking place in the same points, not only serve as adequate means for finer differential diagnosis in lowered conditions, but really allow a more scientific method of subnormal color-perception naming than has been usually employed.

It will be remembered, that whilst speaking of the production of subnormal color-perception, its presence showed one of three things: first, that

¹ Gray's Anatomy, 1862, p. 604.

² Carpenter's Principles of Human Physiology, 1845, p. 234.

there may be imperfect development; second, that properly formed material may be lowered in its vitality through injury or disease; and third, that badly developed structures may be damaged by traumatic action or pathological change. Therefore these well-marked distinctions demand a primary classification of the general condition into two principal heads. First, a congenital defect in which there never has been proper working machinery brought into the world, and where the material from the very commencement of its life's history has been inadequate to the demands required of it by extraneous stimuli. Second, an acquired change, in which either a properly developed structure or a badly formed substance has been physically damaged by some accidental occurrence happening during its lifetime. In each of these two heads, from the first impairment of visible color result to its absolute destruction, there may be crudely differentiated five gross stages of recognizable difference.

First. Where subnormal color-perception is manifested by an incapability to respond to very weak intensities of the entire number of pure natural colors which constitute the normal average power of the human visual apparatus; this expression of inability being more pronounced with those beams of natural colored light which are productive of "green."

Second. In which a greater intensity of the pure natural colors of the entire normal average seen is necessary for perception, accompanied by an absolute loss of response to those beams of natural light which give rise to "green"; the grading of necessary natural intensity following the same general law as in the first stage.

Third. Where still greater intensities are necessary for the proper recognition of those pure natural colors which are as yet sufficiently able to call forth nerve energies for their perception, this being associated with an inability of the lowered material to respond to those beams of natural light which give rise to both "green" and "red."

Fourth. In which the intensities of those pure natural colors which are still visible must be further increased, this condition being combined with an absolute want of perception of those beams of natural light productive of "green," "red," and "blue"; the ratio of intensity following the same order as in the previous stages.

Fifth. In which the last remnants of color-perception manifest themselves by a response to the strongest intensities of the "yellow" portion of the natural color spectrum; the order of increase of necessary intensity being the same as before.

Although it would have been better mathematically to obtain situations, as for instance in the solar spectrum, for the exact value of the representative natural vibrations giving rise to the visible colors known as yellow, blue, red, and green, which would have thus formed an established basis upon which to place subnormal color-perception, yet the existing state of knowledge upon the subject is so crude, that it was found

obligatory to make these arbitrary stages of lowered color-perception without reference to what may have been considered the number and the intensity of natural vibrations chosen for each typical natural representative of such visible color. This faulty naming will be compulsory until national standards for normal color-perception from previously agreed upon natural colors of definite vibration and intensity shall be obtained, and a series of international experiments conducted with the chosen natural colors, in order to find the average results of differently placed and similarly conditioned normal visual apparatuses.

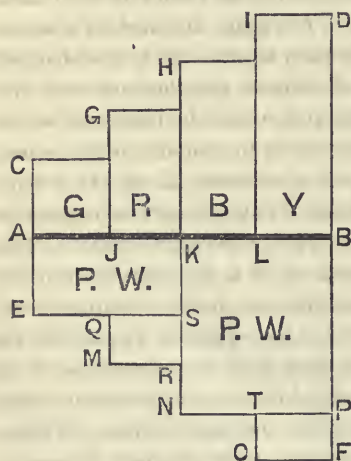
The perceptive result "white," which arises from a compound natural color vibration, has been ignored throughout the definitions of the various stages. This was done designedly. As will be illustratively explained in a series of typical figures representing the various stages of the condition, "white" is in existence as long as its component natural parts are sufficiently strong to produce individual response. The moment that the constituent actions of "white" disappear, that moment the compound result ceases. In the series of experiments conducted to determine the various changes of visible result undergone by similarly sized squares of different colors whilst they were being made to traverse the more and more sensitive regions of the normal ocular retina, the following result was obtained, which bears directly upon this question, *i. e.*, that by common daylight every color tried first appeared as a faint gray, then white, followed by other changes, before it was correctly recognized. This shows that the reception of a compound natural color and the reception of a primary natural color are unlike. The former is the receiving of a *compound* impression (a natural stimulus of great power), which causes the transmission of the entire amount of nerve-energy of the impinged filament tip, whilst the latter is a more complicated action, consisting in the separation of an amount of nerve-energy physiologically equal to the amount of impinging natural force, *from* the "energy-equivalent" resident in the peripheral termination of the impressed nerve fibre, associated with a transmission of a "specific energy" inwards for perception. The latter action is the more difficult of the two, and requires greater nerve strength. By stimulus from ordinary solar light there will be a recognition of "pure white" throughout the various stages of subnormal color-perception, just as long as the lowered vitality of the impinged optic nerve fibril is sufficiently high to receive and transmit for perception any two complementaries of the thousands of complements in this impure variety of compound white light.¹ The moment that either one of the contained complementaries of the last pair of receivable complementaries is incorrectly recognized, that moment the last "pure white" begins to fade into ever-increasing grays until darkness terminates the scene. Long before this

¹ See Theorems of natural color in first paper.

last "pure white" commences to go through its dying stages, thousands of other "pure whites" have passed through relatively similar conditions; each dying in its turn; each passing out of existence in its proper rotation. The series of increasing grays which arise after the death of the last "pure white," must result from a combination of a number of low invisible intensities of what would be "yellow" by heightened intensity, each too feeble in its lower state to give special reception, yet sufficiently strong in combination to cause sensation and consequent perception. As each individual "primary" fades and dies, so will the power of combined color disappear, until at last, when all have gone, color-perception will have ceased.

These stages and their relations to the simultaneous and dependent perception "white" can be graphically described by the following figures.

Fig. 1.



Let Figure 1 represent normal color-perception as obtained from the human visual apparatus after years of exposure to those numerous natural objects which have the passive power of reflecting varying quantities of natural color stimulus.

The heavy ruled base line A B has one square G (for "green"), followed by three rectangles of increasing heights R, B, and Y (for "red," "blue," and "yellow") situated upon its upper side. Each of these areas is supposed to contain a theoretical pile of narrow color strips of each of the above series of "visible color"; each individual color being of the pure type.¹ The height of the area designates the

amount of pure sensory colors which constitute the normal power of the total human visual apparatus for the perception of that particular series of pure natural color; the weaker special visible colors being placed in the upper portion of the color area. The comparative heights of the four areas designate the relative values of the numbers of special colors seen. It has been presumed (roughly), for sake of explanation, that there are three times as many individual "yellow" perceptions as there are separate "green" perceptions. All of the "pure complements" of the "red-green" series, as well as those of the "blue-yellow" series, are each supposed to be on the

¹ "Pure type." That is derived from a pure natural color or primary. Such visible colors will be spoken of as "pure greens," "pure reds," etc. All sensory colors will be placed in quotation marks, as indicative of expressed result.

same level. Situated beneath the base line *A B*, and in connection with it, there is a duplication of the entire area of pure natural color-perceptions: a space which represents the entire amount of recognized results which have arisen from the perception of natural tones and multiple colors;¹ the number of the perceptions being dependent upon the sum total of power that the visual apparatus has under command in the perception of the primary natural colors. The theoretical strips of "compound color" in the lower space are presumed to be wider than those for the individual "pure colors" in the upper space, because in the former there is a stronger stimulus and a greater result. Strictly, the entire lower space should not have been made of the same size as the upper one, but this has been done with the intention of making the explanation easier, and because this discrepancy does not affect the correctness of the figure. The area designated as *A E S K* gives the entire number of "pure whites" that have been obtained from the combination of any two pure complements of the "pure reds" and "pure greens" situated over it, or from any even multiple of such pure complementary colors. The space bounded by *Q M R S* holds all those "impure whites" and "impure blacks" (tints and shades²) which have been caused by the union of impure complements with the remaining "pure reds" of the equivalent area above the base line, which have no "pure green" complements with which to combine in the formation of "pure whites." The area *K N P B* contains all of the "pure whites" which have resulted from the union of any two pure complements or even multiples of pure complements of the "yellow-blue" series. The small space beneath this—*T O F P*—incloses all of those "impure whites" and "impure blacks" which have resulted from the union of impure complements with the residual "pure yellows" of the equivalently placed area above the base line. The entire lower area may also be considered to contain innumerable impure complements which might arise from combinations of the individual primary colors in the upper strips. Therefore, this figure graphically shows a theoretical average power of human color-perception for both the separate and combined forms of the many varieties of pure natural color, and serves as a physiological representative of a definite and comprehensible although uncountable amount of the total number of primary natural colors which have been employed in its formation and have contributed towards its functional existence.

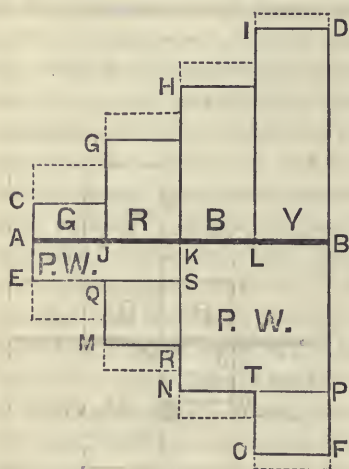
Fig. 2 is intended to represent the first stage of subnormal color-perception where there is an inability to respond to the very weak intensities of the entire number of primary natural colors which constitute the normal power of the visual apparatus; this incapability being more pronounced amongst the "greens." The area *G*, which in Fig. 1 represented the total amount of visible "pure greens," is bisected by a horizontal

¹ Amer. Jour. Med. Sci., Jan. 1885, p. 109.

² Idem, p. 110.

line, this line having the letter c at its extremity. The upper half of the original area G is bounded by dotted lines, meaning that the sensory colors which occupied this portion have been absolutely lost. The small letters

Fig. 2.



G, H, and I, have each been made to drop less and less distances from their previous heights, indicating that a less and less loss has been experienced by each succeeding color series. So far, this figure shows that there is a slight imperfection in the human visual apparatus for the weakest intensities of the four series of primary natural colors, yellow, blue, red, and green. Further, it gives the theoretical order and amount of error, and states which of the series of pure natural color feels the greatest brunt. Beneath the base line A B there is a duplication of this order of loss of intensity and vibration of color-perception intended to show the character of

loss for combined colors. The original area A E S K, in Fig. 1, the representative of those "pure whites" which resulted from "green-red" pure complements, is seen in this figure to be decreased to one-half of its former size, whilst the space bounded by Q M R S, which in Fig. 1 represented the amount of impure black and white results, from the union of impure complements to the remaining "pure reds," has increased in extent, although having been pushed up towards the base line A B. These latter changes show that in the first stage of subnormal color-perception there is dependent upon the previously-mentioned losses an actual loss of one-half of the average number of "pure whites," which are normally derived from the "green-red" series of pure complements, superadded to a relatively less diminution (in fact, an actual gain) in the numbers of impure tints and shades which result from the combination of impure complements with the less weakened "pure reds." The space K N P B, which in Fig. 1 exhibited the amount of "pure whites" resulting from the "blue-yellow" series of pure complements, is lessened in area, whilst the area T O F P has undergone enlargement. The first of these variations shows that there has been a loss of a certain number of "yellow-blue" pure whites, although the relative amount of disappearance has not been so great as that amongst the "pure whites" which have been annulled by the failure of response to the "green-red" pure combinations. The second of these variations shows that a few of the original "pure-

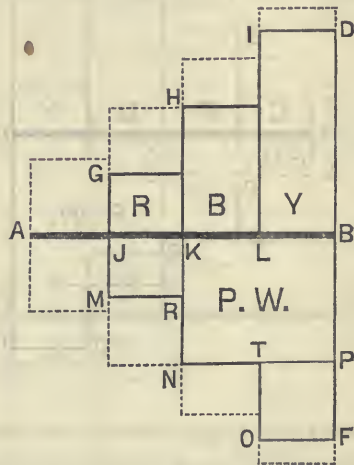
whites" of "yellow-blue" origin have become of the impure type, and have been added to the lessened number of original sensory tints and shades which resulted from the combination of "pure yellow" with impure complements.

Fig. 3 shows the second stage in which a more intense action of the pure natural colors of the entire normal average seen is necessary for perception; this condition being associated with an absolute loss of response to those beams of natural light which give rise to "greens."

Here the space G (for the "greens") above the base line A B is wiped out, whilst the areas R, B, and Y (for the "pure reds," "pure blues," and "pure yellows") have each been lowered in decreasing quantity. Besides graphically illustrating the ratios of change as expressed by the remaining amounts of the different colors, these variations indicate that the visual apparatus has either undergone further pathological alteration of a definite character, or that there is a greater defect in the primary development

of the mechanism than it was supposed to have in the first stage. Perception of "green" has been annihilated; perception of "red" is limited to less than one-half of its original amount; perception of "blue" and of "yellow" are both cut down in unequal proportions; that for "yellow" being the less damaged. In the equivalently sized general space under the base line A B, there have arisen several modifications. The narrow area A E S K, of Fig. 2, representing the amount of decrease in the number of "green-red" "pure whites," which resulted from the remaining number of "green-red" pure complementaries, is entirely wanting in this figure, showing that in this lower condition there are no "green-red" "pure whites." Two-thirds of the area entitled Q M R S, which in Fig. 2 represented the number of impure complements that might arise from the union of some remaining "pure reds" with any other existing sensory color or colors, are abolished. The remaining third has had added to it the remaining unimpaired "pure reds," which of themselves might have continued to give rise to the series of "green-red" "pure whites," seen in Fig. 2, if the "pure greens" had not been lost, but now, upon account of the destruction of the "pure greens," the still large area J M R K is limited to the perception of the union of the contained "pure reds" with

Fig. 3.

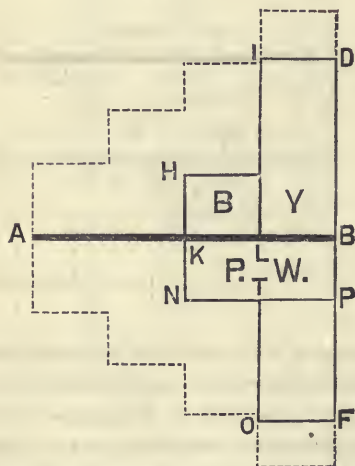


impure complements. The space $K N P B$ in the lower part of Fig. 3 has decreased in area, showing that the number of "yellow-blue" "pure whites" has diminished, whilst the area $T O F P$ occupies a larger extent, this latter change illustrating how the number of "impure whites" and "impure blacks" derivable from the "yellow" series of impure complements has increased, even though there has been an extra percentage of lost "yellows."

Fig. 4 shows the third stage, where still greater intensities are necessary for the proper recognition of those pure natural colors which are as

yet able to call forth nerve energies for their perception, this being associated with an inability of the lowered material to respond to those beams of natural light which give rise to both "greens" and "reds." The space R above the base line $A B$, in Fig. 3, has now disappeared, showing that all perception for the "pure red" has ceased. Both of the areas, B (for the "pure blues") and Y (for the "pure yellows") are still further lowered than they were in the previous figure, this being less marked for the latter series of individual sensory colors. Beneath the base line $A B$, the space in Fig. 3 occupied by those tints and shades of "red" which were still visible,

Fig. 4.



is lost in this figure. Perception of combined color is limited to a lessened number ($K N P B$) of "yellow-blue" "pure whites" than heretofore, associated with an increased amount ($T O F P$) of "impure whites" and "impure blacks," which result from the now greater number of "yellow-blue" "impure complements."

Fig. 5 represents the fourth stage, in which the intensities of those pure natural colors which are still visible must be further increased, this condition being combined with an absolute want of perception of those beams of natural light which are productive of "greens," "reds," and "blues." In this figure the space above the base line $A B$, which was occupied by the area R in Fig. 4, is annihilated, which indicates that there are no "blue" perceptions. The area Y is lessened in height, which shows that there has been a further loss in the number of "pure yellows." Below the base line $A B$, the space which in Fig. 4 constituted the area $K N P B$, and which represented the amount of remaining "blue-yellow" "pure whites," is pressed out of existence. In fact, below the base line there is

nothing but an area $L O F B$ which indicates the amount of "tints" and "shades" that might arise through the combination of the different intensities of the still existent "pure yellow" series.

Fig. 5.

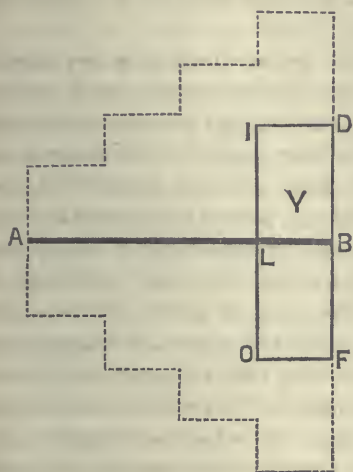


Fig. 6.

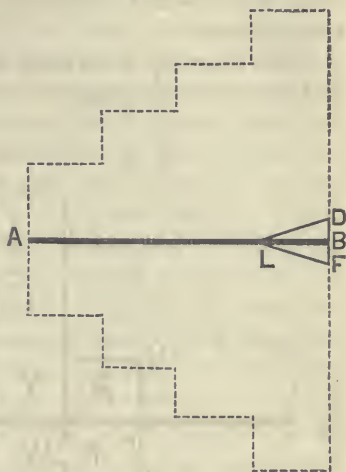


Fig. 6 furnishes a graphic description of the condition in which the last remnants of color-perception manifest themselves by responses to the strongest intensities alone of the "yellow" portions of the natural color spectrum. The triangular space $L D B$ above the base line $A B$ gives the amount of visible yellow primaries. It holds the highest intensities of "pure yellow" perceptions; it shows the dying stages of subnormal color perception, and represents the last individual color to go. The duplicate space beneath the base line contains all of the compound sensory colors which might result from the union of the "pure yellows" situated in the upper space. These combinations in the lower area must be of the impure variety, and consist of gradually increasing "shades."¹ As the upper triangle disappears, so does its fellow beneath, until at last, when all above the base line has gone, the lower area will have ceased to exist, and color-perception be lost.

For convenience of study and for a desire to give an exact locality for the causative fault or change, these five stages of subnormal color-perception have been assumed to take place in a series of differently defined positions of two distinct and separate situations. The first of these principal situations is supposed to be the entire length of the sensic part of one of the optic nerve filaments, whilst the second situation is supposed

¹ They are compounds, and belong to the variety designated as "impure whites."

to be the entire length of the related perceptive tract. After the establishment of these two general positions, it becomes necessary to give more exact seats for the resident fault or error. This can be best accomplished by dividing the visual apparatus into its three originally used divisions—the receiving or ocular retina, the transmitting fibre, and the discharging or cerebral retina,—and then separating the related perceptive elements into their three parts—the low perceptive cell, the conveying fibre, and the high perceiving cell;—after which he may presume that each and every responding nerve fibre, from its peripheral extremity to its most internal reaching, has such separations, and that each individual nerve is liable to the formation of a fault, or to the rise of an error in any such portion of these two principal situations, throughout the entire length. Whilst thus far this classification enables a determinate residency to be given to any imperfection, yet it utterly fails to specify the exact spot of the trouble *in* any such position. The same difficulty as was spoken of during the discussion of the experiments to determine the comparative physiological powers of the nerve structures in the macular region and circummacular region of the ocular retina presents itself here. It will be remembered that no sharp line could be drawn between the two places, because of the gradual decrease of the expressed powers. It will be also recollected that most of the physiological investigations were conducted with the fibres of the furthestmost limits of the generally-used portion of the ocular retina, in contradistinction to the fibres of direct use; this being done, in order to have a comparison between the weakest and the strongest filaments which contain employed nerve force. It will be further remembered that the same nerve fibre was presumed to pursue an uninterrupted course inwards. Consequently, it has been thought advisable to have the nerve fibre, which has its peripheral termination in the macular region of the ocular retina differentiated from the nerve fibre, which has its receiving tip placed in the circummacular region of the ocular retina; this distinction remaining separate and unattached in any way throughout all the post and stations encountered in the entire length of the two fibrils. These various positions can be illustrated best by the following scheme.

Subnormal color-perception.					
Congenital.	{ First stage. Second stage. Third stage. Fourth stage. Fifth stage. }	Fault in sensory apparatus.		Fault in perceptive apparatus.	
		1. In ocular retina.	2. In transmitting portion.	3. In cerebral retina.	1. In low perceiving cell.
		1. In external receiving cell of filament in macular region.	2. In external receiving cell of filament in circummacular region.	1. In continuation of macular filament from external receiving cell to internal discharging cell.	2. In continuation of circummacular filament from external receiving cell to internal discharging cell.
		1. In internal discharging cell of macular filament.	2. In internal discharging cell of circummacular filament.	1. In low perceiving cell in connection with internal discharging cell of macular filament.	2. In low perceiving cell in connection with internal discharging cell of circummacular filament.
		1. In conveying fibre to high perceiving cell from low perceiving cell.	2. In conveying fibre to high perceiving cell from low perceiving cell.	1. In connection with internal discharging cell of macular filament.	2. In connection with internal discharging cell of circummacular filament.
		1. In high perceiving cell.	2. In high perceiving cell.	1. In external receiving cell related to low perceiving cell in connection with internal discharging cell of macular filament.	2. In high perceiving cell related to low perceiving cell in connection with internal discharging cell of circummacular filament.
		1. In ocular retina.	2. In transmitting portion.	3. In cerebral retina.	1. In external receiving cell of filament in macular region.
		2. In transmitting portion.	3. In cerebral retina.	1. In low perceiving cell.	2. In external receiving cell of filament in circummacular region.
		1. In low perceiving cell.	2. In conveying fibre.	3. In high perceiving cell.	1. In continuation of macular filament from external receiving cell to internal discharging cell.
		2. In conveying fibre.	3. In high perceiving cell.	1. In continuation of circummacular filament from external receiving cell to internal discharging cell.	2. In internal discharging cell of macular filament.
		1. In low perceiving cell.	2. In transmitting portion.	3. In cerebral retina.	1. In internal discharging cell of circummacular filament.
		2. In transmitting portion.	3. In cerebral retina.	1. In low perceiving cell.	2. In internal discharging cell of circummacular filament.
		1. In low perceiving cell.	2. In conveying fibre.	3. In high perceiving cell.	1. In conveying fibre to high perceiving cell from low perceiving cell in connection with internal discharging cell of macular filament.
		2. In conveying fibre.	3. In high perceiving cell.	1. In high perceiving cell related to low perceiving cell in connection with internal discharging cell of macular filament.	2. In high perceiving cell related to low perceiving cell in connection with internal discharging cell of circummacular filament.
		1. In low perceiving cell.	2. In transmitting portion.	3. In cerebral retina.	1. In external receiving cell of filament in macular region.
		2. In transmitting portion.	3. In cerebral retina.	1. In low perceiving cell.	2. In external receiving cell of filament in circummacular region.
		1. In low perceiving cell.	2. In conveying fibre.	3. In high perceiving cell.	1. In continuation of macular filament from external receiving cell to internal discharging cell.
		2. In conveying fibre.	3. In high perceiving cell.	1. In continuation of circummacular filament from external receiving cell to internal discharging cell.	2. In internal discharging cell of macular filament.
		1. In low perceiving cell.	2. In transmitting portion.	3. In cerebral retina.	1. In internal discharging cell of circummacular filament.
		2. In transmitting portion.	3. In cerebral retina.	1. In low perceiving cell.	2. In internal discharging cell of circummacular filament.
		1. In low perceiving cell.	2. In conveying fibre.	3. In high perceiving cell.	1. In conveying fibre to high perceiving cell from low perceiving cell in connection with internal discharging cell of macular filament.
		2. In conveying fibre.	3. In high perceiving cell.	1. In high perceiving cell related to low perceiving cell in connection with internal discharging cell of macular filament.	2. In high perceiving cell related to low perceiving cell in connection with internal discharging cell of circummacular filament.

By the use of this scheme, the exact position of any character of definable error can be gotten at a moment's glance; for instance, a congenital subnormal color-perception of the second stage, dependent upon a fault in the transmitting part of the sensory portion of a macular filament, can be readily differentiated from an acquired subnormal color-perception of the third stage which has resulted from some change having taken place in the receiving cell of the sensory portion of a circummacular filament.¹

RÉSUMÉ.—Throughout the entire animal existence, each individual nerve fibre is supposed to be similar in its physical construction and physiological action, although each fibre has its idiocratic ratio of structural substance and value of working force, which peculiarity of constitution and difference of susceptibility to extraneous impression gives the element its representative distinction. Each individual structure of the so-called "five senses" in the human being has a receiving tip, a transmitting portion, and a discharging terminus. Each receiving tip is put in such a position as to be able to change impinging natural impressions of its kind into equivalent nerve-energies. Each connecting link carries these energies inwards to the discharging cell. Each internal discharging sensory cell, which is either in a direct or in an indirect, though intimate relation with some definite perceptive element, causes a complete evolution of the sensation. The fully evolved sensation is transformed into a corresponding and relatively low perception, by certain cells, of related mental growth and power. The evanescent perception, if of sufficient strength, is still further evolved into a higher intelligent perception, either by the deposition of a new cerebral cortex-cell of representative value in the higher mental centres, or by a restamping of some already formed and reciprocal cell in such a position; the first act constituting an automatic perception of the sensation, the second an intelligent perception. This is the completed mechanical action of a sensory nerve where the mentality is called into play, and should not be confounded with those manifestations of motor impulses which result from a lower grade of sensory action. In every living organism there is a system of afferent nerve structures, which are in connection with the great ganglionic centres, and it is in the gray matter of these situations that the sensory-motor combinations are effected. If the sensory-motor nerves be of low type, and if the central ganglion does not

¹ These two theoretical examples might be multiplied indefinitely, and cases cited in support of the various types, but for explanation they are deemed sufficient. The results of other studies in subnormal color-perception are being reserved for other papers, in which such topics as the question of its effects upon "subjective after colors," and "subjective colors;" its manifestation upon mathematically obtained relative intensities of pure natural color; its value in the diagnosis and localization of pathological change; its use in indicating the severity of causal disease; its worth as a prognostic factor; and its service in the further study of normal action, will all be considered.

possess mental activity, as in the variously placed human nerve plexuses which control involuntary organic action, the sensation, instead of terminating in perception, gives rise to another and lower form of organic *motion*. Here there is no perception of the action. In each of the human viscera, there are variously graded life powers, such as are so often seen constituting the total nerve force of many of the lowest forms of animation; both being mere involuntary living mechanisms acting identically in one determinate way, no matter what the nature of the stimulus may be. Curiously, the human viscera have coupled with their separate acts some connective link with the brain, as has been frequently shown by the consequences of profound mental disturbances upon visceral excretion and secretion. This is probably due to an ascent in the scale of evolutionized material. Nevertheless, it is certain that the human stomach, intestines, liver, kidneys, etc., each may be set into its peculiar variety of life motion by many stimulating agencies that have been able to find access to its sensory elements, even though the foreign substance should either not be acted upon at all, or its very presence should occasion injurious result upon the organ. As the human viscera are bound together by a chain of ganglia connected by intervening cords termed the "sympathetic system," so the more highly developed, though correlated human sensory organs and voluntary motor apparatuses are united in a ganglionic centre entitled the "cerebro-spinal axis," the latter being the finer material, and capable of better results. In that wonderful complexity of human nerve material, designated as "the brain," which constitutes the most highly developed part of the cerebro-spinal system, there is brought into play, as the result of the highest character of physiological action of the combined higher sensory and motor impulses, a new existence, a governing agent, a mentality, an intelligence, a will, an emotion. In this position there has been "a something more" added to the mere sensation. There is a *perception* of the sensory result; there is a cognizance of a sensory action. To this class of bettered sensory actors belongs the color apparatus. To this highest ganglionic centre the visual channel makes its way. Its individual perceptions are of color alone, because to this character of natural vibration its material is fitted to respond. Each optic nerve fibre brings thousands of transformed natural beams of colored light (equivalent nerve energies) into juxtaposition, with a related perceptive cell (causing color-perception), which perceptive acts are still further evolved into higher mental results by actions and reactions upon other life substances, contained within this ganglionic mass, thus producing higher mental answers of innumerable kinds and characters; one of the lowest of these productions being what is termed "*sight*." The peripheral termination of the visual apparatus consists of a surface of sensory material placed at the focusing point of a compound system of boxed lenses of changeable power; this arrangement being made for the

correct impingement of natural color rays. This portion of the organ is relatively similar to the so-called skin, and in fact the sensory portion of it, in its comparative development, is nothing more nor less than a bundle of highly developed tactile corpuseles. The transmitting portion of the optic nerve has its analogue in the total number of afferent tactile nerves, which, in the visual apparatus, have been gathered together into a sheathed bundle so as to be enabled to pass *en masse* through a small foramen to the central ganglion. The cerebral retina is the compound area of cell termination of the optic nerve, in connection with the related low perceptive cells of evanescent power, and has its equivalent in the series of cerebral sensory areas devoted to the proper physiological evolution of the sensations which give rise to the primary perceptions of taction.¹ Just as there has been an evolution of organic form through physiological action and the transmission of bettered material from parent to offspring, so there have been increases in certain parts of the individual organism. This is seen in the differences of the actions of the sensory nerve fibres in the macular and circummacular regions of the same ocular retina, and serves as a reply to the question why certain elements of the human ocular retina have better powers of receipt than others in the same membranous coat. As the receiving tip of the individual filament is different in grade of substance and ability of action, so its internal prolongations must differ in physical constitution and physiological worth. These differences of organic construction and sensory power, associated with changes in intensity and number of natural color vibrations, give solution to the whole problem of color-perception, and answer the long asked and vexed question—How is natural color perceived?

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ARTICLE XIV.

A CASE OF PERNICIOUS ANÆMIA; RECOVERY. By GUY HINSDALE, M.D., of Philadelphia.

THE following case, which was under treatment at the Episcopal Hospital, Philadelphia, is of such an interesting character, and terminated so successfully, that it is deemed worthy of being placed on record.

Theo. J., æt. 22, a bartender, was admitted to the wards of that institution September 20, 1882, under the care of Dr. Morris J. Lewis. For the past three or four years he had been in the habit of drinking wine, gin, and whiskey freely, and of using tobacco. He had been taking from

¹ These positions have been compared with supposed similar ones for taction. This could have been done with the other senses.

fifteen to twenty-five drinks a day, and he said that the whiskey he drank might be reckoned at half a pint daily. He denied having had any venereal disease or its symptoms, although he had frequently been exposed to contagion. His parents had died in his infancy.

The patient's previous health had been good, and he stated that he had never had four days' illness in his life. He never worked in phosphorus, metals, or paints. He was of good color until his present attack, which commenced two weeks previous to admission. He was not thin; a fair amount of subcutaneous fat was present. Having been costive for some time past, he began to have a dull, continuous pain in the back of the head, which was augmented by exertion. For seven or eight days his conjunctiva had been yellow; a little later his skin was tinged with yellow, but upon admission had more of a waxy-white color. Three days previous to admission he had anorexia, followed by a chill at night with vomiting. His tongue was pale and covered with a white coat. No symptoms of dyspepsia; bowels never loose. Mucous membranes pale.

The patient's spleen was slightly enlarged in the vertical line. Its area of dullness measured 4×4 inches. The area of liver dullness began anteriorly at the sixth rib, and extended to the margin of the ribs, but not below. The superficial veins of the arms were small and of a slightly pink color. There was no lymphatic enlargement perceptible, and no pain on pressure over the bones. Fluid was noticed in the abdominal cavity a few days after admission.

The heart was rapid (120); pulse small, but regular. The apex beat was at the fifth interspace, 1.5 inches within the nipple line, and was quite forcible. There was a soft, long, systolic murmur over the pulmonary artery, and a loud venous hum in the neck on sitting up. There was no œdema; neither had there been any hemorrhages, nor were there any petechiæ.

The blood was examined by Dr. F. P. Henry, one of the attending physicians of the hospital, who reported, October 1st, 985,000, and November 1st, 1882, 890,000 red corpuscles to the cu. mm., one-fifth of the normal number. White cells numbered one to two hundred red, absolutely but not relatively diminished.

The urine was slightly acid; sp. gr. 1.015. No albumen was found after several examinations. Five days after admission, tests showed the presence of bile.

The following is a record of the temperature:—

M.			M.			M.		
E.			E.			E.		
Sept. 20	101		Oct. 8	100	100.4	Oct. 17	99	100
30	102.4	100	9	99	100.8	18	99.5	100
Oct. 1	99	99.4	10	100	100	19	99.5	99.5
2	98.2	99.2	11	100	100.4	20	99	99.5
3	99	100.1	12	98.8	100	21	99	99
4	98.5	100	13	98.8	98.9	22	99	98.5
5	98	100.5	14	98.5	100	23	98.5	98.5
6	99.6	100.5	15	100	100.5	24	98	
7	98.5	101	16	99	100			

The pulse at first remained rather high—110 to 130.

The journal shows that, after the first few days, excepting his pain in the back of the head, he complained of no bad feeling, and only occasionally felt weak and liable to faint. By the end of the first month the color of his face and lips improved. His veins filled up, and the blood became richer and the man stronger. After seven weeks of treatment he was discharged.

The treatment from the start was arsenic, in Fowler's solution, and afterwards arsenious acid in pill, with iron. Cod-liver oil was added after the first week, and quinia and tincture of iron after the second. The patient's diet was liberal, and consisted of milk, mutton, chicken, eggs, etc.

Dr. Albert G. Heyl, one of the ophthalmic surgeons of the hospital, has furnished the following notes:—

"Oct. 8, 1882. R. E. Media cloudy. Margin of the disk obscured below. Retinal arteries, if of abnormal calibre, somewhat increased as regards diameter. The retinal veins were tortuous, apparently flattened, and about double the normal calibre. A number of circular hemorrhages with white centres were observed; most of them were contiguous to large vessels, probably lying underneath them in the deeper layers of the retina. L. E. The condition was much less marked than in the R. E.

"18th. The principal change observed was in the hemorrhages. In some the red coloring matter had been completely absorbed, leaving behind oval or circular white spots. In others the absorption was not complete, and then the patches were speckled with red points. This seems to show that, in certain abnormal states of the blood, retinal hemorrhages may lose the red coloring matter before the remainder of the clot is absorbed.

"A few days later the case was examined by reflecting sunlight into the eyes. Some fresh hemorrhages were observed. Also the optic disk and fundus were of a yellow hue, due, perhaps, to the hæmatin which had escaped into the tissues. The conjunctiva was also noted as being yellow.

"The patient then passed from observation until July 30, 1884. The result of the examination at this date was as follows: R. E. V = $\frac{20}{100}$. Probably with cylindrical correction the vision would have been greater, as the refraction was astigmatic.

"L. E. V = $\frac{20}{20}$.

"In the R. E. the margin of the optic disk was distinct. All over the fundus the fine arterioles and venules were visible, due to the abnormal injection. In the upper half of the fundus the main veins were enlarged. In the lower half the following observations were made.

"(a) The main artery seemed to alter its calibre—sometimes to become thinner, then of normal calibre. (b) If the observer's eye be directed so that the line of sight falls in the vertical plane passing through the vessel, it appears well defined; if it be viewed in a slanting direction, it is very dim, and with difficulty differentiated from the retinal tissue. This may, in a measure, be due to the direction given to the ophthalmoscope, but principally is caused by some abnormality in the blood current. (c) One or two pulsatile movements were noticed in the vessel on the retina; they could not be compared with the radial pulse. (d) From the main artery a branch was given off, of an apparent calibre of 1 mm.; it rapidly diminished to a point, and for the remainder of its course appeared as a fine thread-like vessel; following its course was a vein of similar thread-like calibre. Just before its junction with a large vein the current lost its continuity, appearing as red points separated by white interspaces. There was a general haziness over the fundus, probably due to retinal clouding. In the L. E. the veins were generally hyperæmic. An arterial branch with a conical beginning and thread-like continuation leading to a spot characterized by pigmentary changes was likewise observed.

“These late changes are unknown, I believe, in connection with pernicious anæmia, and point probably to a defective state of the intima of the vessels, dating back to the acute stage of the dyscrasia.”

I have taken the trouble to hunt up this man, and now, over two years from the date of his discharge from the hospital, I find him fully restored to health. He weighs over one hundred and sixty pounds—a gain of twenty-five pounds since leaving the ward. Dr. Henry kindly examined the blood again, and reported, July 31, 1884, “4,500,000 red corpuscles to the cubic mm. No white corpuscles in the specimen examined. The blood may therefore be considered of the normal standard. The blood flowed freely on moderate puncture of the finger, affording a marked contrast to that obtained two years ago, when more than one deep puncture had to be made before a drop could be obtained.”

The ophthalmoscopic examination has been given in Dr. Heyl's report. The man is in full bodily vigor. On listening to his heart, the murmur present during his illness is not heard, but the first sound may be said to be muffled. The second sound is distinct. The lungs are clear. The liver and spleen are both enlarged. The man still drinks beer, but considers himself temperate.

The descriptions by Drs. Sidney Coupland,¹ Stephen Mackenzie,² Pye-Smith,³ Pepper,⁴ Lepine,⁵ and Gardner and Osler⁶ should certainly be read by any one interested in the study of this disease. Pye-Smith says that the diagnosis can never be considered absolutely certain during the patient's life; but he believes that occasionally recovery has taken place beyond reasonable doubt, and mentions, in a list of 122 cases of the disease, 20 cases of recovery, which he believes to be well substantiated. He describes one case which was under observation, however, for only one year after apparent recovery, but in which no blood count was made; also another case, forming the subject of his article, which, after being discharged from Guy's Hospital, improved, was re-admitted, and died fourteen months from the commencement of treatment; another, in which the count fell to 1,100,000, then to 425,000, recovered, the final numeration being nearly five million corpuscles in the cubic mm.

A case of pernicious anæmia,⁷ which was under the care of Drs. J. H. Hutchinson and Morris J. Lewis, in the Pennsylvania Hospital, was discharged apparently well (no blood count was made), and he was able to return to his work as a coal-miner; ten months later he was re-admitted to the hospital with the same symptoms, and, I am informed, died of the disease. Dr. Hutchinson has also seen a second case of fatal remission in

¹ Coupland. *Gulstonian Lectures*. *Lon. Lancet*, 1881, vol. i.

² Mackenzie. *Lon. Lancet*, 1878, vol. ii.

³ Pye-Smith. *Guy's Hospital Reports*, 1883.

⁴ Pepper. *Amer. Jour. Med. Sciences*, Oct. 1875.

⁵ Lepine. *Rév. Mens. de Méd. et Chirurg.* 1877, p. 63.

⁶ Gardner and Osler. *Canada Med. and Surg. Jour.* 1877, p. 385.

⁷ *Medical News*. Philadelphia, February, 1879.

pernicious anæmia. Such occurrences have been recorded by Habershon,¹ Wilks,² and Lepine.³

As for retinal hemorrhages, Coupland states that they do not imply a fatal termination; and, on the other hand, their absence does not necessitate a favorable prognosis. Quinke found no retinal hemorrhages in 9 out of 39 cases.

Pernicious anæmia is therefore not necessarily a progressive disease. The fact that these patients sometimes temporarily regain their health has doubtless tempted some to believe that a cure has been effected, while, on the other hand, the absolutely hopeless view of the affection entertained by most writers has doubtless led others to doubt the accuracy of their diagnosis had they called it progressive pernicious anæmia.

The records of the case which I have furnished, extending over more than two years, and terminating in a normal blood count, and full bodily vigor, add one more to the list of cases which justify us in having a slightly more hopeful view even of so dangerous a malady as pernicious anæmia.

4004 CHESTNUT ST., PHILADELPHIA.

ARTICLE XV.

A CASE OF ONE-SIDED TRANSITORY EXOPHTHALMOS, WITH UNDISTURBED FUNCTION AND MUSCULAR MOVEMENTS OF THE EYE AND THE COEXISTENCE OF ENOPHTHALMOS OR RECESSION OF THE GLOBE. By ROBERT SATTLER, M.D., Ophthalmic Surgeon to Cincinnati Hospital, etc.

EXOPHTHALMOS, or displacement of the eyeball, constitutes a constant and characteristic symptom of the diseases of the orbit attended by inflammatory exudation, also of tumors, cysts, etc., and of traumatic lesions, accompanied by hemorrhagic extravasation. In another rare class of cases, it is equally constant and conspicuous—rupture of the internal carotid within the cavernous sinus, thrombosis of the ophthalmic veins, aneurism of the ophthalmic artery, intra-cranial aneurisms, etc., and, in other instances, it forms the prominent feature of a typical group of symptoms, *i. e.*, Exophthalmic goitre.

Exceptionally it may exist with undisturbed function of the eye, and without resulting in discomfort or annoyance to the individual. The only case I have been able to find on record, illustrative of this rare type, is referred to and described, under the term simple exophthalmos, by Mackenzie, in his work on the eye.

¹ Habershon. Lon. Lancet, 1863, p. 518.

² Wilks. Guy's Hospital Reports, 1857.

³ *Loc. cit.*, p. 63.

Dislocation of the eyeball is due, in the largest number of cases, to mechanical causes, and is pathognomonic of the various inflammatory affections of the orbit, attended by exudative and inflammatory hypertrophy of the retro-bulbar tissues, also of tumors, cysts, aneurisms, etc.;—Endocapsulitis—also of all traumatic lesions attended by extravasation of blood, with or without fracture of the bony walls. It is met with after various operative procedures—optico-ciliary neurectomy, and more rarely after tenotomy of the recti muscles. It has, with few exceptions, been the invariable concomitant of a large group of cases, described by the term which marks its chief or most prominent symptom, *i. e.*, pulsating exophthalmos. Mechanical causes in adjacent regions also frequently decree dislocation of the globe, cysts of the ethmoid, disease of the Antrum Highmorii, etc.

In other instances mechanical causes within or in the immediate neighborhood of the orbit, cannot be assigned to account for the prominence of the eyes, which may vary in degree of protrusion and time of duration—it may even be periodic and transitory—Exophthalmic goitre.

In another class of cases, exophthalmos occurs in connection with a modification of the general arterial tension in Morbus Brightii and cardiac lesions, and again it may develop suddenly, and no assignable cause, either intra- or extra-orbital or general, can be upheld to account for it.

With the exception of the case reported by Mackenzie, mentioned also by Haynes Walton, no reference is made by other authors to a form of exophthalmos, unilateral, and not attended by disturbance of function of the eye or of the general comfort of the individual.

Professor Berlin,¹ in an exhaustive chapter on diseases of the orbit, mentions the various synonyms for displacement of the globe, but no mention is made of this physiological variety of exophthalmos, generally one-sided with undisturbed function and muscular movements of the eye. So slight is it at times as to be hardly noticeable; a recession even of the globe, or enophthalmos, may exist, which, after a brief interval, either the result of change of position of the body or head or by compression of the tissues of the neck, gives way to a sudden and marked protrusion.

The following is the report of Mackenzie's case:—

CASE 196.—The patient was a cooper by trade, and was admitted at the Glasgow Eye Infirmary for catarrho-rheumatic ophthalmia, affecting chiefly the right eye. After he had attended for a few days, it was discovered that if he stooped forwards, although only for a few minutes, he felt as if something was filling or pressing above his right eye, which immediately began to protrude. On raising his head, the protrusion was very striking. In this state he saw indistinctly with the eye. It soon began to retire, and in a few minutes was in its natural place. He had the complete power of moving the eye, when in its natural situation, and moved it considerably even while it was displaced. The iris moved naturally. He complained of considerable pain in the orbit, which was relieved by venesection and the use of mercurial purges. He stated that the protrusion of the eye commenced about five years before his application at the Eye Infirmary, after carrying a heavy load upon his back. It was difficult to assign any satisfactory explanation of the case. The most likely conjecture seemed to be that the protrusion depended on a varicose state of the ophthalmic veins, the blood flowing back through these vessels into the sinuses of the dura mater, when the head was elevated or thrown back, again to gravitate into them, in their relaxed state, when the head was bent forward. There must also have been a defective tonicity of the muscles.

¹ Handbuch der Gesammten Augenheilkunde. Graefe, Saemisch.

The phenomenon of protrusion in this case was noticed accidentally, whilst the patient was under treatment for another affection of the eyes. This peculiarity of the eye had been known to the patient for five years, and its occurrence was associated with the carrying of a heavy load. It was unattended by discomfort, and only occurred when the patient was obliged to assume certain positions, or voluntarily assumed them, to demonstrate the protrusion. Change of posture or simple elevation of the head caused a prompt disappearance of the exophthalmos.

It will be seen that the report of the following case, the subject not seeking advice about the "peculiarity," as he termed it, of his left eye, but simply to be advised in reference to spectacles, as he was becoming presbyopic, resembles in many particulars the interesting case of Mackenzie, and yet it differs in many respects from it, in that additional features of interest existed. The man had noticed it for 25 years. He could not connect its occurrence with an injury. It had never occasioned him discomfort. The vision of the eye had continued undisturbed.

When quietly seated or standing, the left eye was not prominent as compared with the fellow-eye, but, on the contrary, it had receded into the orbit to such a degree, that its sunken or enophthalmic state was as striking and conspicuous as a few moments later the opposite symptom of exophthalmos, which was brought about by stooping forwards or throwing the head backwards.

I can best express the appearance of the left eye by stating that it had "an artificial eye" expression, and my first impression on seeing the man at a distance was, that the peculiar sunken state was due to anophthalmos and the wearing of an artificial eye. That the sunken state of the eye, when the patient was quietly conversing, had probably resulted in consequence of the absorption of the retro-bulbar adipose tissue, due to the repeated emptying and filling up of the tortuous and elastic vascular channels in the apex of the orbit, is probable. It is a question of surmise, although with strong probability it can be inferred, that a varicose or dilated state of the tributary veins of the cavernous sinus, the superior and inferior ophthalmic veins existed, and perhaps, also, that an obstruction or temporary interference, owing to the existence of an anatomical peculiarity of some kind, impeded the venous current in the principal venous outlet of the orbit, the cavernous sinus, whenever the patient assumed a constrained position.

The following is a brief report of the case:—

CASE.—J. L. B., æt. 46. He is unable to assign the exact date when his attention was first attracted to the peculiarity of his left eye. To the best of his recollection, it was in his 18th year that he first experienced a feeling of fulness and protrusion of the left eye; he is confident it existed at the age of 21. At this period he consulted a physician, who discovered the sunken condition of the eye, but who failed to discover any disturbance of vision or other defect; much less was he able to account

for or explain the sunken state and the exophthalmos. He was a sufferer from so-called dyspepsia for many years, but, although he referred repeatedly to the peculiarity of his left eye to his physicians, no desire or attempt on their part to investigate this rare symptom was elicited.

Stat. præ. Man of average height and weight. No marked asymmetry of face or cranium; no recognizable difference on inspection and palpation, between the orbital openings. No history of hereditary tendency to physical peculiarities. No disturbance of sympathetic. No history of marasmus following physical exhaustion or protracted disease. No cardiac disease.

V=1. r. e.; V=1. l. e.; Presbyop. 1. D; reads 1 Sn.

Inspection of face discloses no difference between the two eyes, with the exception that the left appears more sunken. A difference exists in the vertical diameter of the palpebral fissures; the left is smaller. With closed lids, in the sitting posture, there is a perceptible difference between the prominence of the two eyes. The left shows a deep concavity just below the superior orbital margin. On opening and closing the lids the excursion of the upper lid of the left eye is perceptibly retarded on account of the recession of the globe.

The orbital tension of the left side is markedly diminished, even though the eye appears sunken. The tension of the right orbit is normal.

Walking briskly across the room, or resorting to muscular exercise with the arms, influences and affects the position of the left eye; it becomes more prominent. Stooping forward only a few seconds causes a marked displacement of the eye, which, with a little pressure and even without it, recedes quickly when the erect posture is again assumed.

Inclination of the head backwards, the patient in a standing position, affords a conclusive and striking demonstration of both the rapidity of occurrence and also the degree of exophthalmos.

The advance forwards or exit of the eye out of the cavity of the orbit can be readily observed, and the time and extent of the excursion measured. In fifteen seconds it reaches its height, and the eye advances forwards twenty-eight mm. At first, or until it has advanced about ten mm., it is protruded directly forwards, then it diverges and projects in the axis of the orbit. The lids, corresponding to the period of greatest prominence, appear congested, tense, and stretched to their utmost capacity.

With closed eyelids, the exophthalmos, or advance forwards, is not so marked, and measures about eighteen mm. if the lids be separated and held by the thumb and index finger, whilst the head is inclined backwards. The eye advances, and can readily be strangulated or dislocated completely.

Firm compression of the left side of the neck produces the same degree of prominence. Holding the breath, straining, etc., also brings it about.

In the recumbent posture the left eye appears a little more prominent, and the sunken or enophthalmic appearance is not so marked.

The muscular movements of the eye are not interfered with, and binocular vision exists until the exophthalmos exceeds certain limits. Vision remains undisturbed until the prominence becomes great and the eye diverges. During moderate degrees of exophthalmos the muscular excursion and pupillary movements remain undisturbed.

Ophthalmoscopic examination does not disclose anything noteworthy or abnormal.

ARTICLE XVI.

HIATUS IN THE ANTERIOR PILLAR OF THE FAUCES OF THE RIGHT SIDE, WITH CONGENITAL ABSENCE OF TONSIL ON EITHER SIDE. By J. HERBERT CLAIBORNE, JR., M.D., Clinical Assistant to the Chair of Ophthalmology in the New York Polyclinic.

THERE fell under my observation in the office of Dr. E. Gruening, of New York, a case of hiatus in the anterior pillar of the fauces of the right side, with congenital absence of tonsil on either side.

CASE I. occurred in the case of a man, 58 years old, who, on looking at his throat in the mirror, accidentally discovered an unnatural opening on the right side. The hiatus was not complete, but consisted of a niche or furrow of a uniform breadth of three lines. The furrow commenced above and slightly inward, on a level with the base of the uvula, and extended downward and outward, about the middle of the anterior pillar of the fauces, for the distance of about six lines, to a level with the upper border of the alveolar process. The furrow was most shallow above, and gradually became deeper, till it attained at its inferior extremity the depth of about a line to a line and a half. Just below the centre of the furrow and nearer to its median than its temporal edge, was a fistulous opening, oblong in shape, with its long axis downward, and about one line to a line and a half wide; on passing the end of a probe into this opening, it seemed at first blind, but, by giving the probe a downward, inward, and slightly backward inclination, it was made to pass into the space between the anterior and posterior pillars of the fauces, where it could be distinctly seen. Neither in this space nor in the corresponding space on the left side was there any trace of tonsil. The edges of the furrow were nowhere sharply defined, and were soft and smooth. There were no signs of cicatricial tissue. The patient had no recollection of any throat trouble which might have caused it; and, in fact, was not aware of it till he had discovered it accidentally, as before mentioned. This abnormal condition has been observed a few times, but in every case the hiatus has been greater and on both sides.

Dr. J. Solis Cohen (*Diseases of the Throat and Nasal Passages*, 2d edition, p. 206) speaks of the anomaly, and accompanies it with a cut (Fig. 59).

He says: An occasional anomalous condition of the palate consists in a separate mucous investment of the palato-glossus muscle in the anterior fold of the palate; leaving on either side an opening which might be mistaken for ulcerative destruction of tissue.

Cohen also refers to the case reported by Dr. Wolters, of Göttingen, which is given below, together with one very similar, reported by Dr. O. Chiari, of Vienna.

CASE II., reported by Dr. Wolters, of Göttingen (*Zeitschrift für Rationelle Medicin*, 1859).—Whilst the tonsils, under ordinary conditions, are completely inclosed in the niche or isthmus which is formed by the palato-glossal and the palato-pharyngeal muscles (with the exception of a small portion of their inner circumference, which projects toward the median line a little beyond the inner

border of the palato-glossal muscle), their anterior plane presented to my greatest astonishment a cord stretched obliquely from above and within, arising from the uvula and extending downward and slightly outward to the side of the root of the tongue. At the first sight, I thought it was quite probable that an escharotic had been applied on account of some ulcerative process, or some other mechanical injury had caused the defect in the anterior pillars (the posterior were in their normal integrity); apart, however, from the symmetrical arrangement on either side, a closer observation convinced me of the groundlessness of my original opinion; for, not only were there not the slightest traces of cicatrization to be found, but also the patient had no recollection of any pain in the part in question; indeed, up to the present moment, he had never had a suspicion of the unusual condition. Both of the appearances mentioned above, stretching from the uvula to the side of the root of the tongue, were nothing else than the isolated palato-glossal muscle.

CASE III., reported by Dr. O. Chiari, of Vienna (*Monatsschrift für Ohrenheilkunde*).—Both anterior pillars were characterized by an opening, which was greater on the left side than on the right. They were both equally oval; the left was something above 10 ctm. long, and 3 mm. wide. The borders of these openings were smooth, and gave no trace of cicatrization. The mucous membrane of the posterior wall of pharynx was studded in its upper part with large granulations, but, beneath, especially on the lateral parts, it was pale and thin. The mucous membrane of nose and larynx was pale. The posterior pillar and the uvula were normal. The questioning of the parent gave the history of a throat trouble six years before—in the course of which there might have been ulceration. The exactly symmetrical condition, and the smoothness of the edges of the openings are against their ulcerative origin; so much the more so, since there was no sign of cicatrization.

I refer, by permission of Dr. A. Schapringer, of New York, through whose cordial courtesy I have been put in possession of the literature bearing upon the subject, to a case under his own observation, very similar to that reported by Dr. Wolters, which he kindly demonstrated to me, and which is to appear shortly in the *Monatsschrift für Ohrenheilkunde*.

Though the case reported by myself tallies in many particulars with those subjoined, the presence of the defect on one side only, and the congenital absence of tonsil on either side, render it of no ordinary scientific interest.

ARTICLE XVII.

A CASE OF CONGENITAL ECTOPIA LENTIS. By JOHN L. DICKEY,
A.M., M.D., of Wheeling, West Virginia.

A CONGENITAL dislocation of the crystalline lens is certainly sufficiently rare to justify a report of the following case.

Nina McCombs, a slender, light-complexioned girl thirteen years old, was brought to me, by her father, on account of defective vision. She had never been well, her parents thought, from the time she was old enough to observe, and when a child would grope for her playthings, or any object she would attempt to take. She could distinguish the forms, but not the features, of persons near by, and she could not distinctly see objects

at a great distance, as a house on a hill, a mile or more away. She learned to read by holding the book in actual contact with her nose and forehead, and being bright and studious, always stood at the head of her classes. The patient is the second of six children, five of whom are living. She was a full term child, but was small at birth, weighing only four pounds. She never had a fall, or severe blow on the head, or convulsions, and only slight attacks of the ordinary diseases of childhood. The rest of the family and immediate relations all have good eyes and normal vision.

On examination, the eyes seemed somewhat flattened with deep anterior chambers. The irides were of a peculiar ash color, with well-marked striæ of a darker hue, and were extremely sensitive to light, contracting quickly to form pin-hole pupils. The irides were both tremulous, except in the upper part, and a slight nystagmus kept them constantly shaking, giving a beautiful effect, like the wavy motion of thin satin curtains.

In order to make a satisfactory ophthalmoscopic examination a mydriatic was used (duboisia grs. ij-3j). With a $+6^D$ glass, by the direct method, could be readily seen the dark, curved outline of the crescent of the lens, clearly defined against the red background. About one-sixth of the lens was visible in either eye, occupying about one-fourth part of the dilated pupil. In the right eye the segment of the lens was in the upper and nasal quadrant of the pupillary space; in the left eye it was directly above, in the middle. Both lenses were transparent, the retinal vessels being distinctly visible through them. They seemed perfectly immovable, not responding at all to the different motions of the eye, and were tilted at such an angle as would make them occupy the same relative position to the wall of the globe as the normal lens. The vitreous was perfectly clear. The fundi seemed normal. There was a marked physiological conus on the temporal side of the left disk. Both eyes proved afterward to be slightly amblyopic, the left more so than the right.

The results of a careful refraction proved to be as follows:—

$$V. O. D. = \frac{3}{CC}, + 13^D \text{ sph. } \bigcirc + 3^D \text{ cyl. ax. } 90^\circ = \frac{15}{L}.$$

$$V. O. S. = \frac{2\frac{1}{2}}{CC}, + 13^D \text{ sph. } \bigcirc + 3^D \text{ cyl. ax. } 90^\circ = \frac{15}{Lxx}.$$

Of course, it proved to be the same with duboisia as without it. Without glasses the patient could read bourgeois type at one and a half, and pica at two inches. With the glasses she could read pearl at the normal distance of twelve inches. The angle and amount of astigmatism suggest that the vertical curve of the cornea, in both eyes, had been preserved by the support afforded by the fixed position of the lenses above.

The satisfaction afforded by the glasses was, of course, very great, for by improving the vision from $\frac{3}{CC}$ to $\frac{15}{L}$ they practically restored the blind to sight.

REVIEWS.

ART. XVIII.—*The Principles and Practice of Gynæcology.* By THOS.

ADDIS EMMET, M.D., LL.D., Surgeon to the Woman's Hospital of the State of New York; ex-President of the American Gynæcological Society, and New York Obstetrical Society, etc. etc. etc. Third edition, thoroughly revised; with one hundred and fifty illustrations. Philadelphia: Henry C. Lea's Sons & Co., 1884.

By the time a book has reached a third edition its character is pretty well known; it has taken a place among standard works on the subject, and there is nothing for the journalist to do but to chronicle the event and congratulate the author. In this instance, however, there is an exception, not as to the congratulations which are heartily tendered, but as to the notice required of the work. Very many changes have been made in this edition. The book appears in smaller type, set more compactly, so that while it now has about the same number of pages as formerly, it contains a great deal more reading matter. Some of the additions are the record of progress which even four years have furnished to this rapidly advancing branch of medicine; others consist of reports of new cases illustrating doctrines, and of quotations from other writers sustaining the author's teachings. But far more important changes than these are indicated in the preface. It is there stated that much of the first edition was expunged, or very much modified, by the advice of a friend, the views being deemed so widely different from those generally accepted as likely to interfere with the success of the book. What those views were, as originally written, we do not know, but the doctrines of the work, as presented, were certainly novel, if not revolutionary. The chief points were, briefly, the importance assigned to venous congestion, the elevation of pelvic cellulitis to the highest position among pathological processes, the recognition of cicatricial tissue as the source of reflex symptoms, a denial of inflammation of the uterus, except puerperal, and consequent rejection of intra-uterine medication. All these were urged with great positiveness, and with considerable harsh criticism of the profession. We have now a new edition in which a wider application is made of the author's peculiar views, in which they are more forcibly urged, and in which new doctrines, the result of further experience, are presented. While, therefore, the very extended notice given to the first edition precludes the necessity of a full examination of this, we have yet to give for the benefit of our readers some idea of what is in many respects a new book, and try to present examples of the modification which the author's views have undergone, and the nature of the new doctrines promulgated.

Naturally we turn first to some of those subjects with which Dr. Emmet's name is most closely connected, and select the one by which he became most widely known—laceration of the cervix and the operation for its

repair. To this subject twenty more pages are devoted in this than in the last edition. Among the new matter we are first struck with the doctrine that it is not the laceration *per se* which is the origin of the consequent troubles, but the blood-poisoning and pelvic cellulitis consecutive to it. Many of these lacerations, we are told, heal up without difficulty; more would do so if the febrile disturbance following labor was referred to its real cause and treated accordingly, a practical hint the value of which no obstetrician will overlook. But the author does not point out how a septic process arising from a tear of the perineum is to be distinguished from one caused by a cervical lesion. The doctrines that blood-poisoning and consequent cellulitis are the chief factors are too important not to be presented in the author's words:—

"A laceration of the cervix, however extensive, will rapidly heal without an untoward symptom, unless blood-poisoning should take place. This occurrence is always accompanied by some general disturbance, and is marked by a septic cellulitis, which obstructs the pelvic circulation so as to arrest involution and repair of the injury."

"When this injury has been received there has existed from the beginning a pelvic cellulitis, of supposed septic origin, and as long as this inflammation remained afterwards, the leucorrhœal discharges continued and the raw surfaces remained unhealed. In consequence of the obstructed circulation, due to the cellulitis, the parts began to roll out soon after the reception of the injury, and as the woman, with arrested involution, assumed the upright position certain mechanical forces exaggerated the difficulty."

The contrast can be better seen by the following extracts placed in juxtaposition:—

"Whenever the rent has extended to the vaginal junction, or beyond, there will exist a tendency for the tissues to roll out from the uterine canal as soon as the wound assumes the upright position."—*Second ed.*

"Whenever the rent has extended to the vaginal junction, or beyond, and a cellulitis has been set up, there will exist a tendency for the tissue to roll out from within the uterine canal, to be greatly increased as the woman assumes the upright position."—*Third ed.*

Again, on page 456, it is set forth, that "so long as the cellulitis remains to any extent," not only will the woman suffer from pelvic symptoms, difficulty of locomotion, and menstrual disturbances, but there will follow headache, disordered mental action, insomnia, with melancholia and other forms of insanity. All these consequences are referred to the cellulitis, and not a word is said in connection with the laceration.

Not only these more or less remote symptoms, but the cervical catarrh is now referred rather to a cellulitis than to the injury of the cervix itself:—

"So far as the relation of cause and effect exists, I am positive in the opinion that a follicular discharge is never found existing to any extent with a laceration of the cervix, unless some pelvic inflammation is also present which can be detected at least by means of a rectal examination. The increased secretion is first caused by the cellulitis, and as the mucous and submucous tissues become more congested they roll out more and more from the seat of laceration."

In the last edition this "rolling out" of the tissues, or uterine ectropion, was the direct result of the laceration, produced by gravitation of a subinvolved uterus, and by the mechanical influence of a hypothetical hitching of the cervix on the vaginal walls; now it is the result of

cellulitis. But not only this: formerly the "rolling out" was the one distinctive evidence of the lesion, and to roll in with tenacula the everted lips of the cervix was the demonstrative proof that a laceration existed. Now, it is no proof at all! marked eversion may exist in a nulliparous subject, as the result of a cellulitis, and may be cured by treatment of this cellulitis, the everted surfaces rolling in again as the inflammation disappears, and a virgin os remain! Such a case is reported on page 460, and the consequent doctrine results, and is emphasized by italics, that "*preparatory treatment may be necessary sometimes even to make a diagnosis as to the existence of the lesion.*"

Consequent upon these doctrines comes, naturally enough, an elevation of the importance of treatment, with the admission that many cases can be cured without operation. Those who declined to receive the views of the former editions, and who maintained that there was some mistake about the general necessity for operative interference, will read this portion of the book with great satisfaction. Dr. Emmet now operates on a much smaller number of cases than formerly. Moreover, in commenting (p. 485) upon the results obtained by one of his enthusiastic followers, who has operated on over one hundred cases without any preparatory treatment whatever, he expresses doubts whether, if the after history of these cases were known, the results would be satisfactory, and he makes the following admission, most damaging to the position heretofore given to the operation:—

"A temporary benefit is gained in almost every instance after the operation; but it is the exception to the rule if a relapse does not take place within a few months after, if the preparatory treatment has not been administered beforehand, and the operation employed at the last *with the chief object of keeping what had been thus gained.*"

In the chapter on the operation for repair of laceration of the cervix there is not only the candid admission, but all through the text there is the evident recognition of the fact that this operation has been abused. It could not be otherwise as human nature is constituted. It having been demonstrated that an injury resulting from childbirth was sometimes the sole cause of grievous symptoms formerly attributed to other pathological conditions, it was natural to elevate the truth to the dignity of a general law, while the temptation to a brilliant cure is always strong. Thus the cervix and the perineum have been made to bear the brunt of a vast amount of surgery. It is easy to find lesions by those who are anxious to find what they seek. For the abuse of this operation Dr. Emmet is not to blame. His discovery of the importance of the lesion, and his operation for its repair have been accepted generally by the profession of the world as valuable contributions. Nevertheless, this protest of the discoverer and originator against abuse of the measure was needed, and it will do much to restrain it within just limits.

In a former review of this work we expressed doubt as to the importance of cicatricial tissue in a healed cervical laceration as the source of reflex symptoms. It is but just to say that further experience sustains Dr. Emmet in this point, as shown by numerous instances given in the concluding chapter on this subject, nevertheless accompanied by the admission (p. 486) that disappointment is often experienced in operating for such symptoms, and that it is impossible, with our present knowledge, to select the cases with precision.

That portion of the book devoted to injuries of the pelvic outlet furnishes the most striking example of the new doctrines which the author promulgates in this edition. They are such as to arrest the attention of every reader, and so widely different from generally accepted views as to demand notice. The chapter upon laceration of the perineum involving the sphincter ani stands substantially as before, and to this form of injury the term "laceration of the perineum" is now restricted. Chapter XX. is now headed "*So-called Lacerations of the Perineum*," and an entire new chapter precedes these upon "Prolapse of the Posterior Wall of the Vagina." It is here that we find doctrines which are revolutionary, for the value of the "perineal body" and of the perineum itself as structures affording support to the uterus is plainly and emphatically denied! That triangular body, which has been considered so essential a part of the perineum, and which it is so important to restore in every operation upon these parts is no longer worthy of any consideration! The opening clause of the first extract is certainly extraordinary:—

"Scarcely any author has attempted, at any length, to show the use or supposed physiological bearing of the perineal body, but all have reiterated the accepted statement that it is the main support upon which rest the pelvic organs through the aid of the vaginal canal. On this supposition no little ingenuity has been spent in the repair of a lacerated perineum by the building up of a body far more in extent than nature ever furnished, which has proved often an obstruction to the entrance of the vagina, and led to the certainty of rupture at the subsequent labor."

" It can be shown that the perineum gives no support to the uterus directly or indirectly. Prolapse of the uterus never occurs directly from loss of support where the perineum had been lacerated, and, unless the muscles have been involved to the extent of rupture through the sphincter ani, the injury sustained is seldom more than a superficial tear through the skin, and, to a limited extent, into the connective tissue."

The chief office of the perineal body, if not its only office, is stated to be to give support to the curve of the rectum, and rupture of the perineum is said to produce no inconvenience, after the parts have once healed, with rare exceptions in which reflex symptoms are produced by cicatricial tissue. The author's argument cannot, of course, be given in full; its chief point is the extensive laceration sometimes seen without consequent symptoms and the great distress sometimes observed where the injury is but slight. The true lesion, according to the author, is not external, but internal—subcutaneous and submucous—and consists of laceration of portions of the muscles, or a separation of the fascia, extending from the sulcus on each side, from its connection with the vaginal outlet, and this may occur without external injury. Anatomical illustrations or diagrams should, on no account, have been omitted here, but there are none. Twelve years have elapsed, the author says, since he recognized that the lost support was to be restored by means of the posterior wall of the vagina, and for three years past he has been performing the operation for this purpose which is here presented and described. The object is to "unite the posterior surface of the perineum to the recto-vaginal wall." The description of the operation is not satisfactory. If simplicity be the measure of the perfection of an operation, this one is far from perfect. Evidently there has been an omission, as three tenacula are to be brought together, while only two have been mentioned. By the aid of the cut readers may be able to understand it; to us this cut clearly demonstrates that Dr. Emmet can pass a needle through tissues in a more curved course than anybody else

can. Those who would attempt the operation should note the particular directions for performing it, the liability to failure from taking up just a little too much tissue, or from not judging correctly as to the number of sutures.

The advantages of the new operation are said to be marked :—

“No comparison can be drawn in regard to the gain to the patient by lessening the suffering and discomfort which always attended every method as formerly used for closing a lacerated perineum.”

Turning now to the chapter on “so-called laceration of the perineum,” in which the old operation is described, we find in the closing paragraph the two operations compared and read :—

“Essentially the same extent of vaginal surface is denuded by both operations, also the same trefoil shape is formed, . . . exactly the same surfaces are united by both operations. . . . The object is essentially the same. . . . The only difference lies in the direction and mode of introducing the sutures.”

The author calls this new procedure an “operation for diminishing the vaginal outlet.” Is it to be known in the medical world as another “Emmet’s operation?” With the conservative teachings of this edition as to the operation for laceration of the cervix, and with the open admission that that has been abused, is there now another operation brought forward to run the same course? It is with more than regret that we read the indications given for this new method, part of which we italicize :—

“There can be no doubt as to the necessity for an operation *after the vaginal canal has become relaxed from any cause*, or when the perineum has been extensively lacerated.”

Under this teaching there is, of course, no limit to the number of patients that can be submitted to the operation. If followed, gynæcology will again be subjected to reproach. What effect will this have upon the author’s reputation?

Many other subjects, some of them of deep interest and of great practical importance, invite attention. Duty, however, impels us rather to call attention to some changes and additions which we think should have been made in this edition, but which do not appear. We allude particularly to the brief attention given to some very practical points and every-day diseases, as compared with that devoted to certain operative procedures. This feature of Dr. Emmet’s work did not escape observation upon the appearance of the first edition; it ought not to pass unnoticed in the third. The chapter upon sub-involution of the uterus may be specified. It occupies just one page and a quarter. Granted that, in the majority of cases, this condition of the uterus is secondary to some lesion, and that under the head of the primary affection its treatment has been considered, still sub-involution not infrequently comes under observation, or appears to the young practitioner, as an independent disease. Then there is the similar condition of “malarial congestive hypertrophy,” recognized by the author in one of the first chapters of the book, and the powerful influence of iodine in reducing the bulk of the uterus is there stated. These considerations force the conviction that more space should have been devoted to this condition and its treatment have been more fully detailed, even at the risk of some repetition.

The same observation may be made as to the very important and practical subject of menstrual derangements. All these are treated of in one

chapter of twenty-four pages, which chapter includes also all the author has to say on hysteria. From among these affections we may select menorrhagia as one which shows markedly a want of due attention. There is a class of these cases, coming very frequently under the observation of the family physician, for which we think we had a right to expect information and assistance from the author. They are cases of menorrhagia in young girls just as the periodical function begins. The affection in this class of subjects dependent upon "a condition of general plethora," is recognized. But such an origin does not obtain in a respectable minority of cases. Menorrhagia is frequently found in young girls of spare habit, of rapid growth, of overtaxed powers at school, and in girls of a marked "ovarian type," who are the reverse of plethoric. They are subjects in which every right-minded man postpones as long as possible any investigation as to an organic origin of the trouble. Meantime their treatment requires both judgment and skill, and the young practitioner often feels the need of a wise counsellor.

Again, one of the most frequent causes of menorrhagia and metrorrhagia as they come under the observation of the practitioner is retained portions of an ovum. This cause is recognized by the author, but it is coupled with the statement that, as thus arising, the derangement does not come within his purview! Why it does not, is not stated. Consequently, then, we have no directions for treatment of such cases by removing the cause with the curette, an operation which the practitioner will need to perform scores of times before he sews up a lacerated cervix. The curette is mentioned in a succeeding chapter in connection with growths from the internal uterine surface. It receives only condemnation, which could but be expected, from the author's views as to intra-uterine applications of all kinds. In this condemnation of the curette we wish Dr. Emmet had stated why the original instrument of Récamier "has proved a most objectionable one." It has not the cutting edge of the instruments of Simpson, Sims, and Simon, it is as blunt as Thomas's wire loop, and, in our opinion, the original instrument has never been improved upon. It is to be regretted that it is not to be found at our instrument-makers.

These deficiencies of consideration of certain subjects come naturally from the position occupied by the author. He whose practice is bounded by the walls of a hospital sees many and severe cases which well fit him to be a teacher of the profession, but he is too apt to overlook those phases of disease which in general practice, and especially to the young practitioner, are matters of great importance and of very frequent occurrence.

There are some omissions of importance scarcely to be expected in a work so certain to be turned to for reference. Thus, in regard to amputation of the inverted uterus, it is to be regretted that the author has not incorporated statistics of the mortality of the operation later than those of Schröder and Ziemssen's *Hand-book*, or those published in the *American Journal of Obstetrics* for 1868. True, it is an operation which the author does not sanction; still the highest authorities agree that it must sometimes be performed. If done, the best results have been obtained by the elastic ligature, the mortality being less than by the wire gradually tightened, which is here stated to be the best, while the elastic ligature is not even mentioned, although introduced by Courty in 1874, and in his last edition, 1881, is stated to be beyond comparison the most effective and the safest measure. Nor are attempts at reduction so void of danger as here stated. Denucé gives the mortality at 10 per cent. in cases of reduc-

tion before involution, and 6 per cent. afterwards, while in the reduction of recent cases it is as high as 18 per cent.¹

The work of Dr. Emmet having reached the stage of existence indicated by a third edition, an inquiry as to the influence it has exerted, and that it will exert, especially upon the younger members of the profession is legitimate. In some respects it will be markedly for good. Its admonitions of caution in interfering with the uterus in some ways, its inculcation of the necessity of the closest attention to details, its directions for absolute cleanliness, its reiteration of the necessity of searching for and duly considering extra-uterine inflammation, cannot but be beneficial. There are other directions, however, to be considered. When we read the lament (p. 648) that

“There are more men in the country to-day who would seize the first opportunity presenting to get out an ovarian tumor, or an ovary, than there were thirty years ago, who would have been willing to cut a tonsil.”

The queries immediately arise, Whom have we to thank for this state of affairs? If complicated, not to say fantastic, operations are devised and taught to be necessary for lesions of every-day occurrence, is it surprising that enterprising and ambitious men will undertake other operations far simpler in detail and execution?

Farther, will this book prove to be the foundation of a “school” of gynæcology, as is more than hinted in the preface? Its doctrines are promulgated with energy and with a positiveness verging on dogmatism. They are based upon clinical observation, and command respect from even those who reject them. They concern many points which are not yet fully understood, and upon which different opinions are held by equally competent observers, and as a multiplicity of remedies surely indicates the incurability of a disease, so surely does diversity of opinion show that the truth has not yet been attained. Time alone can answer the query propounded. Meantime, we hazard the prediction that when an enduring school of gynæcology shall appear, its foundations will be in harmony with the doctrines of general pathology, its elements will extend beyond the affections of single tissues or organs, and it will be built by one who can hold with a steady hand the balance in which is determined with precision the relative value of surgical and medical measures of treatment.

If in this notice attention has been called to a number of points which could not be spoken of in terms of laudation, we maintain that we are not inconsistent. No jot or tittle of the high praise bestowed upon the first edition is abated. It is still a book of marked personality, one based upon large clinical experience, containing large and valuable additions to our knowledge, evidently written not only with honesty of purpose, but with a conscientious sense of responsibility, and a book that is at once a credit to its author and to American medical literature. We repeat that it is a book to be studied, rather than read, and one that is indispensable to every practitioner giving any attention to gynæcology.

J. C. R.

¹ *Traité Clinique de l'Inversion Uterine.* Paris, 1883.

ART. XIX.—*Latest Porro-Cæsarean Statistics, with an Analysis of all the Cases.*

1. "*Porro's Operation: A Supplement.* By CLEMENT GODSON, M.D., Consulting Physician to the City of London Lying-in Hospital," etc., being a continuation of the record published in the *British Medical Journal* of January 26th, 1884. *Ibid.* Jan. 17th, 1885, pages 120-122.
2. *Sulla Operazione Porro. Studia critico-statistico, del Truzzi Ettore.* 1°. Assistente presso la R. Scuola pareggiata di Ostetricia in Milano. (*Annali Universali di Medicina e Chirurgia*, vol. 269. Ottobre, 1884, pp. 387-394. Novembre, 1884, pp. 401-428.)
The Porro Operation, a Critico-Statistical Study. By ETTORE TRUZZI, First Assistant of the Royal Obstetrical School of Milan.

DR. GODSON has added fifteen cases to his former table of 137, making it 152, but appears not to have seen the two numbers of the *Annali*, issued in October and November, in which Dr. Truzzi gave twelve additional, that he obtained mainly by correspondence with the operators, making in all 164 cases. Both of these writers have once, and with success to mother and child, performed the operation, and that of the former is the only one not fatal in England, in the cases where the fœtus was developed to a viable age. Dr. Truzzi is the successor of Dr. Mangiagalli (whose Porro record was noticed in this journal, and who is now a Professor in the Royal Medical School of Sassari, in the island of Sardinia); and enjoys the advantage of being the associate of Prof. Porro himself. It is much to the credit of the three junior members of the staff of Santa Caterina that they have operated upon four women without losing one; one of them having had two cases. When we recall the number of Cæsarean operations that have in the past been performed in the same hospital, and their frightful mortality, we can appreciate the change effected by the improvement of Porro, and the confidence with which it is performed. In no hospital in the world is greater care exercised to insure success, and the time of operating has been reduced to from twenty-five to forty minutes. In one European operation, two hours are said to have been consumed, and another is claimed to have required but fifteen minutes.

One of the advantages gained by the removal of the uterus and ovaries is, that it will undoubtedly cure malacosteon. This I have upon the authority of the letters of several operators, whose patients have recovered after having been crippled and bedridden. It is thought essential, to effect an early cure, that the woman should not nurse her infant, and it has been proposed by Dr. Fehling, whose three malacosteon women were cured, to perform Battey's operation as a means of arresting this bone disease. As it is his expectation to make trial of this process when he has a suitable case, we shall no doubt hear in time of the result of the experiment: it is certainly one that promises success in some cases.

Tabular Record of Porro-Cæsarean Operations, commencing with the last one in Godson's Table, published in October, 1883.

Nos. continued.	Date of operation.	Name of operator.	Locality of operation.	Result to woman.	Result to child.	Condition of woman before operation.	Form of operation.	Cause of death in woman.
138	March, 1880	Dr. Laroyenne	Lyons, France	Died	Living	Favorable	Porro	Peritonitis.
139	Nov. "	" Fochier	" "	"	Dead	"	"	Septic peritonitis.
140	Oct. 11, 1883	" H. Fehling	Stuttgart, Ger.	Recovered	Living	Unfavorable	"	R.
141	Dec. 25, "	Prof. A. Hegar	Freibourg, "	Died	Dead	"	Muller	Peritonitis.
142	Jan. 9, 1884	" Späth	Vienna, Aust.	Recovered	Living	"	Porro	R.
143	" 26, "	Dr. H. Fehling	Stuttgart, Ger.	"	"	Favorable	Muller	"
144	" 30, "	Prof. Tiboue	Turin, Italy	"	"	"	Porro	"
145	" 30, "	" A. Simpson	Edinburgh, Scot.	Died	Dead	Very unfavorable	Muller	Peritonitis.
146	Feb. 14, "	Dr. Herman	London, Eng.	"	Living	Unfavorable	Porro	Tubular nephritis, œdema of lungs; slight peritonitis.
147	" 15, "	Prof. G. Braun	Vienna, Aust.	"	"	"	"	Shock and exhaustion.
148	" 20, "	Dr. Cuzzi	Vigevano, Italy	"	"	Very unfavorable	"	?
149	April 10, "	Prof. L. Dumas	Paris, France	"	"	Favorable	"	Peritonitis.
150	May 2, "	Dr. Franzolini	Sarcento, Italy	"	Dead	Unfavorable	Muller	Pleuro-pneumonia.
151	" 3, "	Prof. Sânger	Leipzig, Ger.	"	"	"	Porro	Septicæmia.
152	" 17, "	Dr. Uietti	Bergamo, Italy	"	Living	Very unfavorable	"	Fecal extravasation through ulcer of intestine.
153	June 10, "	" Comolli	Como, "	"	"	Unfavorable	"	Septic peritonitis.
154	" 10, "	" Truzzi	Milan, "	Recovered	"	Favorable	"	R.
155	" 25, "	Prof. A. Breisky	Prague, Aust.	"	"	"	"	"
156	" 28, "	" Späth	Vienna, "	Died	"	Unfavorable	Muller	Peritonitis.
157	July 15, "	" Chiara	Florence, Italy	"	"	"	Porro	Double nephritis and hydro-pericardium.
158	" 23, "	Dr. Guzzoni	Pavia, "	Recovered	"	?	Muller	R.
159	" 23, "	Prof. R. Novi	Naples, "	"	"	Favorable	Porro	"
160	Aug. 15, "	Dr. E. Falaschi	Siena, "	Died	"	Very unfavorable	"	Peritonitis.
161	Sept. 11, "	" F. Barnes	London, Eng.	"	"	Unfavorable	"	Septicæmia.
162	Oct. 23, "	" Vincenzo Lesi	Inola, Italy	Recovered	"	Favorable	"	R.
163	Nov. 13, "	Prof. Fritsch	Breslau, Ger.	"	"	Anæmic	Muller Pedicel dropped	"
164	Dec. 2, "	Dr. Handfield Jones	London, Eng.	Died	Dead	Unfavorable	Porro	Peritonitis.

Operations in different Countries, not including those performed before the Fœtus was viable, which are placed in Class 2.

Italy . .	43 operators ;	65 operations.	Women saved,	28 ;	percentage,	43 $\frac{1}{2}$
Austria . .	9	34	" "	20	"	58 $\frac{1}{4}$
Germany . .	16	" 28	" "	9	"	32 $\frac{1}{2}$
France . .	7	" 15	" "	5	"	33 $\frac{1}{3}$
Great Britain	8	" 9	" "	1	"	11 $\frac{1}{8}$
United States	3	" 3	" "	1	"	33 $\frac{1}{3}$

Besides the above, there were a few operations performed in each of several other countries, viz., in Belgium four, saving two women; in Switzerland two, both saved; in Holland one, saved; in Russia, one, saved; and in Spain one, lost.

General Summary.—The average number of operations *per annum* is now about 25. There were 33 in 1880; 21 in 1881; 25 in 1882; 22 in 1883; and as far as ascertained 23 in 1884. Of the 164 cases recorded, many of which are not yet published by the operators, the Porro method, *unmodified*, was employed in 109 cases, many of them very unfavorable, with 46 recoveries. Müller's modification was used, *without the experimental addition of Veit*, in 41 cases, with 21 recoveries. Veit's addition of dropping in the pedicle (stump) was tried in completing both forms of operation, in 14 cases, with only 4 recoveries. This is a very inviting process, but far more fatal than where the stump is treated by the extra-peritoneal method. In six instances the Müller method of turning out the uterus, after making the long abdominal incision, was abandoned, and the cases managed by the Porro plan; of these 6, 4 were saved. From the 164 women, 166 children were extracted, two bearing twins; of these 129 were "living," *but not moribund*, and 37 were dead or moribund. The Italian operators saved 53 children, and lost 13; the German 18, and lost 10; the Austrian 32, and lost 3; the French 10, and lost 5; the English and Scotch 6, and lost 3; the United States 2, and lost 1; and the Belgian and Swiss saved all delivered, *i. e.*, 4 and 2 respectively.

In the Krankenhaus of Vienna, under five operators, there have been 26 operations, saving 13 women and 23 children; in 3 of the fatal cases the stump was ligated and dropped in. In Santa Caterina Maternity, of Milan, also under five operators, there have been 13 operations, saving 10 women and 13 children. The Müller modification has been used but once, and in case 2, which proved fatal. The first and second operations were fatal, as was also the ninth, which last died of strangulation of the bowels. The Müller modification has only been used 7 times in Italy, saving 3 women.

In calculating the risks of the Porro-Cæsarean section, as founded upon its statistics, I think it but just to the originator to reduce the 164 operations to 147, by excluding 3 moribund cases operated upon to save the children, and 14 in which the stump was dropped in, proving fatal in 10. This will reduce the number of women recovered to 65, and give a percentage of 44 women saved. Of the 147, there were 90 cases regarded as "*favorable*," "*fair*," or "*not unfavorable*" for the operation, and of these 53 recovered and 37 died. There were also 57, rated as "*unfavorable*," "*very unfavorable*," "*deplorable*," etc., of which 13 recovered and 44 died. As a hospital operation, particularly when the patient is prepared beforehand, and the time carefully selected, the results have been very encouraging, as shown by the Milan record above.

Prof. Breisky, of Prague, has saved all five of his patients in hospital; Prof. Porro, of Milan, 4 out of 5; and Dr. Fehling, of Stuttgart, 4 out of 5. Prof. Carl Braun, of Vienna, saved 8 out of 12, losing one in which he dropped in the stump. The cases operated upon in private houses number only 23, of which 10 recovered and 13 died, showing no special advantage over those in hospital. The best record of any country, it will be noticed, is that of Austria, where the operators averaged nearly 4 cases each, and would no doubt have saved over 60 per cent. but for the fatal results in Vienna of dropping in the stump, in three cases. Of 8 cases not operated upon in Vienna, 7 were saved, by four operators. In Germany, nearly one-half of the cases saved (4 out of 9) were by one operator, whose success amounted to 80 per cent.; the other 15 operators saved but 5 out of 23; hence the efforts made to revive and diminish the mortality of the old operation, on the part of Sänger, Kehrer, Leopold, and other Germans. Great Britain as yet, like our own country, has had but one success, and her average is even lower than by the old operation. Dr. Godson has his honor undivided thus far by any one, although six others have operated since the date of his success. Laparo-elytrotomy failed also twice, although 6 out of 10 have been successful in this country.

The English subject appears, from all the tests that have been made, under what otherwise should be favorable circumstances, to be a very bad one for abdominal delivery, although ovariectomies have been remarkably successful. Rickets and malacosteon appear, much more than cancer, to be predisposing causes of failure, and when poverty, with its starvation, and intemperance are superadded, there is very little to encourage an operator in making his prognosis. Success in the Porro operation is in a degree national, and depends for its greatness, not only upon care, skill, and promptness, but very much, also, upon the subject of it.

Delay in operating was long believed to be the foundation of ill-success in Great Britain, in the old Cæsarean section; but this plea is no longer tenable, since it has been shown by 33 cases that early operating has saved but 25 per cent. In eleven of these cases labor lasted from 2 to 10 hours, 8 children were saved, but all of the women perished. In the United States, the number of cases in which the time is *noted in hours*, from 2 to 10 inclusive, amounts to 13: of 6 "favorable" cases, 5 recovered; of 5 "unfavorable," 1 recovered; and of 2 "very unfavorable," 1 recovered, making 7 women saved out of 13, with 9 children: five of the women were dwarfs, of whom three recovered. Of cases in the United States, in which the measure of time in labor is designated by the expressions "*short*," "*early*," "*a few hours*," and "*several hours*," I find 9, with 4 recoveries, and 9 children saved. The term "*early*" is a very unsatisfactory one, being at best only relative: six or eight hours would not be early, in a dwarf of 3 feet 4 inches in height, and 65 pounds weight, as was one in this list of nine. As there were 25 children saved, by the 33 British operations, it is to be presumed that the cases were of an average character. Three cases were not in labor; in another it was induced, and no case exceeded 18 hours. In 17 women, the time ranged from 0 to 10 hours, saving but 4 of them; and in 16 more it ranged from 11 to 18 hours inclusive, saving also 4; total, 8.

With the exceptions of Denmark, Norway, and Sweden, I know of no country in which the Cæsarean operation has been more fatal than in Great Britain. Like it, the Porro operation is largely dependent for suc-

cess upon the condition of the patient at the time it is performed. This is very clearly established by the record already analyzed. If, then, a timely elective and prearranged Cæsarean operation must have an unfavorable prognosis because of the physical condition and poverty of the subject, can much more be anticipated from the Porro improvement under the same disadvantages? Laparo-elytrotomy, which has been tried, but not tested under favorable circumstances in England, may prove less fatal than either, as it neither wounds the uterus nor opens the peritoneal cavity.

Class 2.—In this division Dr. Godson has placed the less fatal operations of removal of the uterus and ovaries in cases where the fœtus was not yet viable. These operations now number 10, with 7 women saved. Eight cases were affected with uterine fibro-myoma, one with vaginal occlusion, and in one the uterus had been punctured in error, in performing ovariectomy in Australia. Twice has this accident happened and been treated successfully by the Cæsarean operation, under Dr. Byford and Sir T. Spencer Wells; and although the Australian case recovered, it left a primipara of 21, without uterus or ovaries, because of an error of the operator in using his trocar. We believe this is carrying the Porro mutilation to an unjustifiable degree.

Class 3.—*Prévôt's Application.*—This Moscow process of treating the uterus after it has been ruptured, by amputating it after the Porro method, has now been tried seven times, and all of the women have perished, viz: one each in Russia, Germany, France, and England, and three in Italy. We see nothing to recommend this plan over the much less fatal one of closing the uterine rent by sutures; neither do we find anything to justify the mutilation where there is no pelvic deformity. The new method of closing the uterus in the Cæsarean operation by deep and superficial sutures, with the peritoneum turned in, can be applied after laparotomy and cleansing to a uterine rent with fair promise of success, as many cases have recovered without suturing. But to secure a strong union, and guard against a repetition of the accident, we believe there is better safety in the suture. Quite recently we noticed the advocacy of Prévôt's method before a society in New York; but its measure of fatality, we presume, could not have been known.

Class 4.—Among the operations called Porro, have been three, in which one cornu of a bifid uterus with its ovary has been removed, together with a dead fœtus within the cornu. Of these cases two recovered. In that of Säger, of Leipzig, the cornu was ligated, and the peritoneum stitched over it with eight sutures, after which it was dropped in; the woman recovered.

R. P. H.

ART. XX.—*A Practical Treatise on Disease in Children.* By EUSTACE SMITH, M.D., F.R.C.P. Lond., Physician to His Majesty the King of the Belgians, Physician to the East London Children's Hospital, and to the Victoria Park Hospital for Diseases of the Chest. 8vo. pp. 844. New York: William Wood & Co., 1884.

DR. EUSTACE SMITH is already favorably known to the American profession as a frequent contributor to the English medical journals, and as the

author of an excellent Manual on *The Wasting Diseases of Infants and Children*, which has recently passed into its fourth edition.

From the preface we learn that the present book was prepared on the invitation of Messrs. Wood & Co., of New York, "to write for them a Complete Treatise on the Diseases of Infancy and Childhood." If the publishers were compelled to cross the Atlantic in search of an acceptable author, they showed good judgment in the selection of Dr. Smith, whose long official connection with the East London Children's Hospital has given him exceptional opportunities for the study of the diseases of early life. Dr. Smith has not only given, in the volume before us, the fruits of his own rich clinical experience, but almost every page bears tangible evidence of his familiarity with current pediatric literature. The excellent work done in this department of medicine by American authors is duly recognized by numerous references in the text.

The author undertakes to discuss from a clinical standpoint the whole subject of disease in early life, and has therefore admitted to his pages "descriptions of every form of illness which is influenced in its manifestations by the early age of the patient. Those only have been purposely omitted which, like diabetes, present exactly the same characters in the child that they do in the adult." This fact gives to Dr. Smith's Treatise a completeness enjoyed by but few of the many excellent works on Pediatrics now before the profession. The author's claim to completeness can not, however, be fully sustained.

While it may be perfectly proper to consider at length such rare maladies as scurvy, hydatids of the liver, cirrhosis, megrim, etc., the omission of a chapter on a disease so frequent and dangerous as ophthalmia neonatorum is a matter of regret, and appears inexcusable in a treatise aspiring to be complete. Issuing from an American publishing house the inference is that the work is designed especially for American students; if so, it would be better were the prescriptions compounded according to our Pharmacopœia. The British Pharmacopœia is used, and unless this fact is borne in mind unpleasant effects may follow the administration of some of the doses recommended. For example, Dr. Smith gives ten drops of the tincture of belladonna to a newly born infant, and twenty or more drops to a child one year old, but the author is speaking of the tincture of the B. P., which is only about one-half the strength of that of the U. S. P.

The introductory chapter with which the book opens deals with the peculiarities of disease as it occurs in children, the effects of the various diatheses, the predominant influence of the nervous system, the proper methods of examination, general consideration upon therapeutics and kindred subjects. The fact is strongly emphasized that

"Children are not merely little men and women in whose bodies disease manifests itself by exactly the same tokens that are familiar to us in the case of the adult. They have special constitutional peculiarities which give to disease in early life a character it does not afterwards retain, and invest the commonest forms of illness with strange features which may be a source of obscurity and confusion."

He who masters this chapter will have taken a long stride in the successful management of the diseases of the nursery.

The subject-matter of the volume is arranged in twelve parts.

Part I. is devoted to the acute infectious diseases. The group of eruptive fevers receives the attention which its importance and frequency demand. The clinical pictures are sharply drawn, and the treatment

recommended is essentially that of the latest authorities. In speaking of the prophylaxis of scarlet fever the following statement is made, which, if corroborated by subsequent observation, will mark an important advance in the management of epidemics :—

“Belladonna, which was at one time largely employed with this object, has been now proved to be useless. It seems likely, however, that in arsenic we have an agent of greater value. It has been noticed that a person who is being treated with arsenic cannot be successfully vaccinated, and it is possible that the drug may have a counteracting influence upon other forms of infective matter. Practitioners who have made use of the remedy with this object speak favorably of its prophylactic virtue. Dr. W. G. Walford has given the drug largely to children who had been exposed to the infection of scarlatina, and states that out of nearly a hundred such cases in only two did the development of the fever follow, and both cases were extremely mild. He recommends the ordinary liq. arsenicalis (P. B.) in as large a dose as the age of the child will allow, with sulphurous acid (M xv—xxx), and a little syrup of poppy. The child should take the dose regularly three times a day at the first; afterwards less frequently.”

The statement that arsenic will prevent successful vaccination cannot be accepted as absolutely correct, since the writer has, within the past year, successfully vaccinated a child whose system was thoroughly under the influence of that drug, given for an eczema.

The author is not fully in accord with the doctrine that the specific diseases are caused by micro-organisms. He does not even allude to the recent researches of Prof. Eklund and others as to the parasitic nature of scarlatina, and in speaking of diphtheria holds the following language :—

“Diphtheria is no doubt the consequence of a specific poison, however this may originate. The essence of the disease has been attributed to spherical bacteria (micrococci), which have been discovered swarming in the false membranes and exudations from the inflamed mucous surfaces; but as similar bacteria have been found in the secretions thrown out by ordinary non-specific stomatitis, too much importance must not be attributed to the presence of these organisms. The real nature of the virus has yet to be discovered.”

Dr. Smith, while questioning the absolute identity of membranous croup and laryngeal diphtheria, considers a very large proportion of the croup cases to be diphtheritic in nature: he does not assign a special chapter to the discussion of true croup. After fully restating the customary arguments, *pro* and *con*, he sums up as follows :—

“From consideration of the above facts and arguments the only conclusion to be drawn is that a large proportion of cases of membranous croup are cases of laryngeal diphtheria. It does not, however, follow that membranous laryngitis is never due to any other cause than the diphtheritic poison. The child's larynx is especially prone to membranous inflammation; and if, as has been positively stated, a true false membrane may be set up by burns, scalds, and other irritants to the air-passages, it is possible that the disease may occasionally occur independently of the diphtheritic virus.”

There is no allusion to mercury in the treatment of this disease; an omission which, in view of the very favorable reports made during the past three years of the internal administration of the bichloride, especially in the laryngeal form of the disease, is hardly pardonable. There is certainly no other treatment in vogue to-day which has given as satisfactory results. The author is an ardent advocate of operative interference when the disease (diphtheria) invades the larynx :—

"Directly, therefore, we feel sure the larynx is involved, the operation should be undertaken without delay. . . . The success which often attends the operation of tracheotomy in membranous croup is very encouraging, and even in the case of infants we should not hesitate to have recourse to it."

Dr. Smith does not give any statistics, but it seems to us he speaks too discouragingly of the constitutional treatment of laryngeal diphtheria, and too confidently of the good results to be obtained from tracheotomy. Dr. Jacobi, in his latest utterance upon this subject, in which he is a recognized authority, says :—

"Tracheotomy saves but few of those who take the disease in severe epidemics. In fifty consecutive tracheotomies, from 1872 to 1874, I did not see one recovery. In the last few years I have seen few good results. In average epidemics tracheotomy will save twenty per cent." (*American Sys. of Medicine*, Art. Diphtheria, p. 692.)

Parts II. and III. include the non-infectious, general, and diathetic diseases, the most important chapters being devoted to Rickets, Rheumatism, Scrofula, and Syphilis. The chapter on Syphilis is especially full and exhaustive.

Part V., consisting of nineteen chapters, is devoted to a consideration of the diseases of the nervous system. The chapter on Convulsions is full of practical hints drawn from the author's experience. We regret, however, that he has omitted from his list of causes any reference to preputial irritation. From our own observation we are convinced that it is by no means a rare cause of convulsive seizures in male infants, and have more than once seen circumcision prove effectual in breaking up the eclamptic habit. In speaking of the influence of lead-poisoning in causing convulsive attacks, he says :—

"Infants seem to be very susceptible to the influence of lead given medicinally. I have long ceased to make use of this remedy in the treatment of the diarrhœas of young children, as I have several times seen convulsions follow its employment, and the attacks have appeared to me in some cases to be directly excited by the use of this agent."

He speaks highly of the nitrite of amyl in arresting convulsions, and uses it without fear of danger in young children. The remedy may be given by the mouth or by inhalation. To infants, six or nine months old, one-quarter of a drop may be given in mucilage three or four times a day : the inhalation of a single drop will often speedily arrest an eclamptic seizure, even when dependent upon cerebral disease. The chapters on Tubercular Meningitis and Chorea are exceptionally good. The author is a firm believer in the value of arsenic in chorea :—

"Of all the drugs which have been recommended as specifics in this complaint the only one from which I have ever seen any decided benefit has been arsenic, and with this only in large doses. . . . I have been in the habit of prescribing for a child of five or six years of age ten drops of Fowler's solution of arsenic, directly after meals, three times a day. In this dose it is rarely found to disagree. If the child complain of discomfort at the epigastrium, and vomit a short time after taking the remedy—and these are the only unpleasant symptoms I have known the medicine to produce—it can be given for a time twice a day or in smaller doses. In every case the dose should be as large a one as can be borne without discomfort, and given thus immediate benefit will usually ensue."

One hundred and five pages are set apart for the discussion of the Diseases of the Organs of Respiration. Dr. Smith's connection with the

Victoria Park Hospital for Diseases of the Chest has given him entire familiarity with these maladies, and no one can arise from the perusal of these pages without a firm conviction that the author is master of his subject. The opening chapter is devoted to the consideration of preliminary matters. The best methods of examining the chest in children, the differences impressed upon the physical signs and constitutional symptoms by the age of the patient and the significance of the different signs are clearly and concisely given.

The chapter on Atelectasis, Congenital and Post-Natal, is very complete, and is, in fact, one of the best presentations of the subject with which we are familiar.

We turn with considerable interest to the chapter on Pleurisy to learn how much light the author is able to throw upon the many points in this disease still considered debatable. There is perhaps no other serious affection of early life more often overlooked than pleurisy: this is largely due to the insidious manner in which it is often developed in infants, especially in those suffering from wasting diseases. "In these cases there is often no fever, or only a trifling rise of temperature: there may be no cough, and attention may only be directed to the chest by noticing that the child is breathing quickly and has less appetite than usual for his food." The difficulty of distinguishing between serous and purulent effusion, without an exploratory puncture, is clearly stated. Neither temperature, nor length of illness, nor physical signs offer positive testimony as to the nature of the fluid. The author, however, is accustomed to rely with a good deal of confidence upon a peculiar straw-yellow hue of the face as indicating the presence of pus in the thoracic cavity. This color is unlike the complexion of any other disease, and is seldom observed before the second week of the illness. When the effusion is so large as seriously to hamper the circulation and produce a cyanotic tint of the skin, or if absorption has not taken place after the lapse of three weeks, though no urgent symptoms are present, the use of the aspirator is advised. Even in empyema, it is best in the first instance to employ aspiration, as sometimes after the chest-cavity has been evacuated by this means the fluid is not reproduced. The danger of sudden death from rapid withdrawal of the effusion from the chest is noticed. This accident may arise from syncope, from rapid interference with the function of the healthy lung or from cerebral embolism. If purulent fluid is reproduced after one or more aspirations, or if the fluid withdrawn is fetid, a free opening in the chest-walls and the introduction of a drainage-tube are advised.

"After the tube has been inserted the chest should be bound round with an antiseptic binder, and the pleural cavity may be left to drain itself. It will not be necessary to wash it out with disinfecting solutions unless signs of decomposition have been noticed. If, however, the pus which flows after the operation is fetid, injections of a solution of iodine may be employed, diluting one drachm of the tincture with one ounce of water; or carbolic acid may be used diluted with thirty times its bulk of water. This measure will not be required when the pus continues to be perfectly sweet. In such cases the introduction of antiseptic solutions seems to keep up an irritation which it is desirable to avoid. Moreover, the operation is usually distressing to the patient, and is not without danger, for syncope and other alarming symptoms have sometimes been seen to follow the introduction of the fluid."

In view of the well-recognized danger of poisoning from the absorption of carbolic acid, we are inclined to question the propriety of using it at all for washing out the pus cavity: in any event, it should be more largely diluted than is recommended in the above quotation.

The diseases of the digestive organs are considered at length in Part IX.

Infantile Atrophy, or the slow wasting which is so common in hand-fed babies, first receives attention. This condition, which, under the name of "Marasmus," finds a large place in all mortuary tables, the author states, "is a perfectly curable complaint, and may be arrested at almost any stage by the exercise of judgment and care in the feeding and general management of the infant."

In this chapter, as in fact all through the book, great stress is laid upon the proper feeding of infants: "But whatever may be the nature of the malady, and however elaborate may be the medication required, the details of nursing should always take precedence of drug-giving."

Dr. Smith strongly emphasizes the fact, so often overlooked in practice, "that feeding and nourishing are not quite the same thing." Fresh cow's milk is considered the most eligible substitute for the mother's milk. Condensed milk is "usually well digested, but the nourishment it supplies is very inefficient for a growing baby."

Barley water is the author's favorite diluent for cow's milk and rarely disagrees with the youngest infant. In those cases in which ordinary cow's milk is digested with difficulty, Dr. Roberts's method of pancreatizing the milk is highly approved. As peptonized milk is steadily growing in professional favor, we append the formula here given:—

"To a pint of new cow's milk is added half a pint of boiling water, two teaspoonfuls of Benger's pancreatic solution, and twenty grains of bicarbonate of soda dissolved in a little water. The whole is stirred up in a jug, which is afterwards covered, and then placed in a warm situation under a 'cosey.' At the end of an hour, the contents of the jug are emptied into a sauce-pan, and the mixture is boiled for two minutes to stop further action of the pancreatine upon the milk. The food is then ready for use. It may be sweetened to the child's taste with sugar of milk."

The author describes three forms of diarrhœa. Simple non-inflammatory diarrhœa (mild intestinal catarrh), acute inflammatory diarrhœa (severe intestinal catarrh, or entero-colitus), and choleraic diarrhœa (infantile cholera).

Our space will not permit of a detailed analysis of these interesting chapters, but we may say in passing, that they are exceedingly clearly written, and will prove trustworthy guides in the diagnosis and management of these common and dangerous maladies.

The volume closes with several chapters on those diseases of the skin most commonly met with in young children. Although we have had occasion to point out some of the shortcomings, and to dissent from some of the teachings of Dr. Smith's book, we wish to say that, in our opinion, it is one of the best treatises now before the profession. Unquestionably it is the ablest "British" work on the diseases of children with which we are familiar: it has, however, some strong American rivals, which it will not speedily supplant in professional favor.

For a first edition, the work is very free from typographical errors, although an unusual number of well-known proper names are incorrectly spelled. However, a very unfortunate misprint occurs on page 676, where the author, in discussing the treatment of intussusception, advises: "For a child of twelve months old, one-twentieth of a grain of morphia and a *sixth* of a grain of atropine may be used every half-hour until some sensible effect is produced upon the symptoms." He who blindly follows the text will doubtless soon enough perceive "some sensible effect." W. J. C.

ART. XXI.—*Eleventh Annual Report of the State Commissioner of Lunacy of the State of New York, for the year 1883.* By STEPHEN SMITH, M.D., Commissioner of Lunacy. 8vo. pp. 491. New York, 1884.

THE Legislature of New York created a Board of State Commissioners of Public Charities in the year 1867. New York was the second State, Massachusetts having been the first, to provide for the supervision and examination of all charitable and correctional institutions receiving State aid, with power to visit and report upon all hospitals, asylums, and other places where the insane were confined. In the year 1872 the Board being of the opinion that great advantage would be derived from the experience and counsels of a medical associate, procured legislation conferring upon them power to appoint an additional secretary, to whom should be referred matters relating specially to the interests of the insane. In 1874, the separate office of Commissioner of Lunacy was created, with defined and independent powers, all connection with the State Board of Charities dissolved, and for eleven years the incumbent has been at the head of this department of the State administration. The several reports of the Commissioner have had a limited circulation, and are only to be found in the repositories of public documents. The valuable information procured at great expenditure of time and money has been practically inaccessible to the medical profession and the public, because of the refusal of the Legislature to print any extra copies. This is to be regretted, as the profession and the public are interested in obtaining from official sources knowledge of the actual state and requirements of the various asylums for the insane, and their internal administration, not only on account of the apparent increase of insanity, and the large sums annually required to provide accommodation for the insane, but also because the frequent agitation of what are called "lunacy reform" questions has tended to exercise a disquieting effect upon the public mind.

The lunacy history of the past fifteen years has been characterized by unusual activity in the erection of hospitals for the insane, by suggestions and actual changes in the plans of construction of a radical character, marked improvement in their internal administration, proper as well as unreasonable criticism of asylum management, investigations prompted by allegations of abuses, improper detention, as well as a desire to amend the laws providing for the commitment of the insane, and to improve the official inspection and supervision of the asylums. Legislatures are usually ready to give ear to allegations of abuse of a public trust without due consideration of the sources from which they spring, yet it must be stated that the many investigations throughout the country have shown, aside from the occasional unpleasant experiences which must ever attend the care of the insane, a remarkable exemption from official mismanagement.

There is usually some outcome from a legislative inquiry, and the agitation in the State of New York in 1874 led to a revision of the lunacy laws, a new form of commitment, and the creation of the office of Commissioner of Lunacy. The tendency of legislation in the State of New York has been toward centralization of power and responsibility in administration of public affairs, and, as the public works and the prisons have severally been placed under a single head, so the supervision of the

State lunacy system has been devolved upon one person styled the Commissioner of Lunacy. There is a grave objection to a commission composed of one member. While the reports of an efficient officer may become a valuable repository of expert information, there can be no permanent accumulation of experience in conducting examinations, as a retiring commissioner will carry with him the important personal knowledge he may have acquired. Such a loss to the service and the State could not occur if the commission were composed of several members with a continuous succession. The term of service of the Commissioner is fixed at five years. Under such circumstances in any department of the public service, it may frequently happen in the future as in the past, that when an officer might be expected to be best qualified to prosecute his work from the valuable experience acquired, he must give place to a new incumbent, who in turn spends the term of his official period in obtaining but a superficial knowledge of its duties.

The report before us was made by Dr. Stephen Smith, who, in 1882, succeeded Dr. Ordronaux, the first incumbent of the office. Dr. Smith is known to our readers as one of the valued contributors to the medical periodical literature of this country, as an author, teacher, member of the National Board of Health, and as an industrious, honest, and patient student of any work he may undertake. The report is a document of 491 pages, and bears evidence of a painstaking effort to present the actual condition and administration of the several asylums, public and private, county poor-houses and asylums where the insane are cared for, as they appeared to him on actual inspection, clothed as he was with the ample power, and charged with the responsible duties, of a public inquisitor. He has not deemed it necessary again to repeat the histories of the asylums, or to discuss medical theories and questions pertaining to insanity, which have encumbered so many reports from this office. The intelligent and candid readers may, therefore, in view of the allegations which have too frequently been made in reference to asylum administration, form their own conclusions, and perceive how a plain statement of facts from an unbiased and unimpeachable observer furnishes a refutation. The Commissioner has introduced his official probe in every direction, and presents the minute details of hospital life and administration. The report is to be commended to State officers, who are too prone to present their own conclusions, without furnishing the data which led to their formation.

Whether it was wise to dissolve the relations which existed between the Board of State Charities and the Commissioner of Lunacy, does not appear from the eleven reports thus far presented. Both departments have co-ordinate powers in the visitation of public institutions where the insane are cared for, yet there has been some embarrassment as to the limits which should define the powers of each. The greatest weight will, however, attach to the observations and criticisms of a trained professional inspector in the estimate placed upon questions strictly medical.

The scope of the Commissioner's work may be comprehended from the number of the insane in the State and in institutions Oct. 1st, 1883 :—

In State hospitals and asylums, eight in number	3,900
City asylums, and city almshouses	5,016
County asylums and county poor-houses	1,869
Private asylums	558
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Aggregate under care	11,343
The number in family care, not in asylums estimated	5,000
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Total	16,843

The annual increase for the last decade has averaged 500, from which it may be estimated that in 1900 the whole number will exceed 20,000.

The total amount expended in plant by the State for the care of the insane is	\$5,865,327.70
The amount expended for support of insane in the State asylums for the year was	\$777,144.35

The contemplation of these statistics and the extraordinary probabilities of the future cannot but arrest the attention of the profession, which must be charged with devising preventive measures, of the tax-payers on whom the burden of support must rest, and of those who may feel charged with the duty of directing a public policy toward the insane.

The insane of the State of New York are found in asylums designated for the reception of recent cases, asylums designated for the chronic insane, private asylums, city asylums, almshouses, and an asylum for the criminal and convict insane. A majority of the trustees of one of the asylums must, by law, be advocates of the homœopathic system of medicine, which seems to have been one phase of an attempt to establish a State medicine. There is within the State an illustration of every system proposed for the care of the insane. It is not a matter of surprise, therefore, that the Commissioner remarks that "No one can examine the condition of the insane, and the institutions devoted to their care and custody, without being painfully impressed with the entire absence of any well-organized and permanent system of management of this unfortunate class in the State of New York. They are found in every conceivable condition, from the cheerful and healthful apartments of the State asylum to the loathsome and pestilential cells of the county house. Within sight of each other, there stand to-day in this State, institutions devoted to the care of the insane of the same class, in one of which are witnessed the vices which characterized the management of similar institutions a century ago, and in the other are found all the ameliorating conditions of the highest practical philanthropy." Incongruous as the whole system appears to be, there is a history of gradual but decided progress beginning with the enactment of a law in 1827, prohibiting the care of lunatics in jails, and marked successively by the establishment of the State lunatic asylums for the indigent insane, and others of the acute class; the creation of a State asylum for the criminal and convict insane; the creation of the Willard Asylum for the chronic insane, with a mandatory clause requiring the insane in poor-houses and those discharged from the hospitals not recovered to be transferred to the Willard Asylum—thus aiming to place all of the insane under State care—the act creating a State Board of Charities, with powers of visitation, and other powers; the act creating a Commissioner of Lunacy; and, lastly, the application of civil service rules to the appointments in asylums for the insane.

It would appear that the criticisms apply rather to the insufficiency of county and municipal arrangements for the care of the insane. The

incapacity of county and municipal officers is proverbial. They are given to questions of taxation and politics, and sentiments of philanthropy or the medical care of the insane have no abiding-place with them. The history of county care of the insane everywhere is that of scandalous neglect, frequently calling for the interposition of the sovereign power of the State. If the asylum system has proved inadequate, the Commissioner might have stated that the new hospitals had cost so much, and the scale on which they were projected was of such a magnitude that the legislature had not furnished the money to complete the buildings. For this result those who have approved the plans were in part responsible. The cost of construction and subsequent maintenance has had the effect to cause the retention in their homes, and in poor-houses, of many insane persons who otherwise might have been received in the State asylums.

The successive steps of legislation that have been noticed indicate a considerable advance of public sentiment, and that State supervision of the insane wherever located is now the established practice and policy of the State. The commissioner is not vested with power to interfere with or direct the administration of the asylums, but it is wisely limited to the correction of evils as he may determine that they exist, and for this purpose may issue an order, which, if resisted, he may present to a justice of the Supreme Court, who may take proceedings for its enforcement. The Board of State Charities, also, whenever satisfied that the provision for the insane in any county poor-house is inadequate or insufficient, may direct their removal in ten days. Ample power is thus vested in state officers to correct manifest evils and abuses, and in the report before us we observe that the two boards have cordially co-operated to discharge the responsibility placed upon them. The commissioner and secretary of the Board of State Charities jointly inspected thirty county poor-houses, and the thirty remaining county-houses were visited by the secretary alone, or in company with a commissioner of the Board of State Charities. Comparing the condition of the county-houses as described in the Commissioner's report with inspections made by Miss Dix, Dr. Willard, and the secretary in 1868, it is evident that a quiet but decided transformation has taken place in the direction of improvement. The discreet manner in which the visitations were made, changes suggested, transfers advised, combined with a consciousness that the state officers represented the sovereignty as well as the best sentiment, induced a prompt co-operation on the part of county officers. Assurance has also been furnished that the power to correct abuses exists, that it is effectively applied when required, and responsibility may be located if it is not exercised.

While the medical profession has been foremost in promoting the proper care of the insane wherever found, its interest centres in the administration of the State hospitals and asylums. It is a subject of congratulation that the commissioner, a member of the medical profession of acknowledged standing and excellent qualification, with no asylum proclivities or affiliations, has presented a report of what he observed and ascertained with painstaking minuteness. The manner and extent of inspection of the State asylums were as follows: The records were examined to ascertain the officers on duty and leaves of absence; the nature of the medical service; correctness of the medical certificates; dates and completeness of entries in the case-books; amount and kind of restraint; number at work and kinds of employment; number taking narcotics and kind of drugs used; number filthy and requiring night attendance; number and nature

of accidents ; number of visits and meetings of managers. The bed-rooms were inspected as to cleanliness, amount, kind, and condition of bedding ; store-rooms as to quality of stores, methods of issue, etc. ; the wards, dining-rooms, tables, and kitchens as to equipment ; the bath-rooms and water-closets as to their sanitary condition and water supply ; patients as to their bodily cleanliness and existence of skin diseases ; and dining-rooms while patients were at meals. The steward's books were examined as to the methods of purchase and itemizing accounts and also the system of auditing accounts and checks by which irregularities can be detected. Night inspections were made to determine the condition of patients. Opportunities were given to all who desired private conversation, their complaints noted, and inquiries were made into any alleged abuses. Although "the Commissioner is empowered to enforce certain measures by means of an order in the name of the people of the State," and "the Commissioner has studiously investigated every case, where, from complaint or evidence, there was reason to believe that it might be necessary to exercise these remedial powers, he has found no instance where such relief as the case demanded was not found to be obtainable through the ordinary channels." "The evidence that any person was wrongfully deprived of his liberty by being committed to and confined in any asylum for the insane in this State, has not proved conclusive." Dr. Ordonaux, for eight years Commissioner of Lunacy of the State of New York, made a statement, that during his term of service, though his office was open daily, no complaint of improper detention was made to him, and he had not discovered a case of detention for improper purposes. These statements from official sources should set at rest the ill-founded suspicions that improper and illegal commitments to the asylums exist.

For several years a degree of distrust of asylum administration has existed in the public mind, promoted somewhat by representations emanating from members of the medical profession, which the Commissioner probably had in mind in the course of his examinations. It has been assumed that the amount of mechanical restraint was excessive ; that where mechanical restraint was not used, narcotic and depressing medicines were substituted ; that more occupation might be encouraged ; that the superintendent, being by law (which he had no part in framing) responsible for the proper administration of every department of the asylum, could not render his patients that attention they required ; that the medical staff, not being acquainted with advanced doctrines of neurology, therefore could not treat insanity, and, as a consequence, recoveries had diminished. The criticisms of asylum management have served to increase the popular distrust which so-called "asylum outrages" and the inevitable unpleasant experiences incident to the care of the insane excite, and seem to have suggested the legislation, founded on suspicion, in several of the States. On the other hand, hospital officers have undoubtedly been led to examine their own work, to institute comparisons, and introduce commendable improvements in their practice.

The Commissioner's report shows the number of hours mechanical restraint was applied, and the kind in use, from which we infer it is fairly reduced to a minimum, or is wholly abolished. The best attainable results have not however been reached, as it is well understood that mechanical restraint may be dispensed with to the extent that a higher standard of attendance may be substituted in its place. The abolition or diminution of restraint must be regarded as a measure of the quality of

the service of the hospital. While the use of restraint may not be wholly abolished, the day has probably gone by when its use will be commended and defended as it has been by American superintendents.

The report of the use of narcotics does not sustain the allegations that their use is excessive or suggest a suspicion that they have taken the place of restraint. On the contrary the quantity is surprisingly small—less than the best practice would seem to sanction—one asylum, for instance, reporting but three doses of narcotic medicine administered during the year. It is one of the repeated experiences of hospital practice that the diminution of restraint is attended with a greater degree of quietude and a reduction of the quantity of narcotic medicines administered.

As diverse opinions exist as to the organization of hospitals for the insane, we quote the opinion expressed by the Commissioner:—

“A critical examination of the organization of the service of the asylums of this State, and very frequent personal inquiry and observation as to the practical daily operations of such service, has convinced me that the legislature has wisely laid upon the superintendents of asylums the duties of executive officers, and clothed them with such large powers, to be exercised under the jurisdiction of boards of managers. Abuses may occur under any system of administration of such public trusts, where large numbers of officers and employés are essential to the proper performance of the routine duties involved, but it is certain that thus far, during forty years of activity, the asylums of this State have been managed with a degree of success and popular satisfaction scarcely attained in any other branch of the public service. Though the parent institution, the State Lunatic Asylum, has been the subject of frequent and severe criticism, and the most searching and exhaustive official examination into its affairs, yet no indictment has been found, and it is to-day one of the most popular asylums in this country. Its wards are always filled to repletion, and no asylum can show so large a percentage of recoveries.” “While it might be possible to attain to as great efficiency in management by a division of responsibility, in my opinion such a result would be a rare exception. The opportunities for peculation are many, and when once the supervision of the single responsible head is withdrawn, they might be abundantly improved. The same would be true of the efficiency in management, when the machinery was disjointed, and each part was run in its own interest by independent heads. The objection to the law making the superintendent the sole executive officer, based upon the supposition that he is thereby prevented from giving that attention to patients which they require, is equally fallacious. It is true that a superintendent may neglect his patients, and devote himself entirely to the business affairs of the asylum. Neglect of patients would probably occur with such a superintendent if he had only medical duties to perform. It is certain that no such instance of incompetency has come within my knowledge in this State.”

The accumulation of chronic cases in the asylums and elsewhere, the diminished and diminishing number of recoveries, is one of the most serious subjects to contemplate in connection with the report before us. It foreshadows the increasing burden and calamity of lunacy to individuals and the State. The increase from year to year is so regular as to suggest the operation of uniformly acting causes. The Commissioner has not considered the causes of the diminution of the recoveries as compared with those of former years, the subject of preventive measures, whether the hospitals are now organized in the best manner to treat the cases that are susceptible of improvement, nor does he offer any criticisms or suggestions. Of the alleged causes of insanity, about forty per cent. may be considered avoidable or preventable, inherent to the social organization and condition which we call our civilization. All these relations

deserve the more careful consideration of sociologists, and study of those engaged in the moral and intellectual training of the young. A good work is yet to be accomplished in this field. Notwithstanding the fact that insanity appears to be increasing in the State of New York in a greater ratio than the population, and that the knowledge and study of nervous diseases have increased during the last decade, the percentage of recoveries reported in the hospitals has been lower than ever before. While formerly the duration of insanity before admission to the hospitals was less than six months in the majority of cases, during which period the probability of successful treatment is greatest, during the last decade the duration of insanity in the largest number of cases was more than six months prior to admission. The inference is unavoidable that the insane that are curable have been retained at home, or elsewhere, too long, from distrust of the asylums, or for treatment outside of a hospital. Whether the publicity and form that attend commitments to the hospitals, which modern legislators have deemed it wise to enact, and whether physicians hesitate to take the responsibility of making a certificate of insanity until active symptoms are present, have served to retard the prompt treatment of the insane, are fair questions to be considered in this connection. From whatever cause the majority of the insane appear to have reached the hospitals in a chronic and incurable state. Of the number of curable cases treated at homes and in private families, or the results of such treatment, we have no knowledge as no reports are made, and, therefore, no comparison with hospital statistics can be made. In England the Lunacy Commissioners do not look upon the isolated care and treatment of the insane with favor. We would regret to see the practice of treating single patients in licensed or unlicensed houses introduced in this country, unless such houses were under the management of competent medical men.

Our space does not permit us to do more than present the scope and extent of the Commissioner's report, which is a monument of official industry, fidelity, and hard work. It is apparent from a perusal of the report that great advances have been, and can be, made in the internal administration and standard of care of the asylums, which must result in the restoration of confidence. It is a complete official refutation of many of the allegations so often recklessly made. It illustrates the good service that may flow from co-operation with the wise counsels of a state officer, and the importance of a state system of inspection, under which the best methods may be ascertained and applied. J. B. C.

ART. XXII.—*A Text-Book of Hygiene. A Comprehensive Treatise on the Principles and Practice of Preventive Medicine from an American Standpoint.* By GEORGE H. RÔNÉ, M.D., Prof. of Hygiene, College of Physicians and Surgeons, Baltimore; Member of the American Public Health Association; of the Medical and Chirurgical Faculty of Maryland, etc. etc. pp. 324. Baltimore: Thomas & Evans, 1885.

THE elevated standard of medical education demanded by the Illinois State Board of Health in regard to sanitary science has not only resulted in the addition of chairs of hygiene to several of our more progressive colleges, but has also stimulated the production of suitable text-books, of

which this one is, as far as we know, the first purely American representative. In his pithy preface Prof. Rohé informs his readers that the aim has been to place in the hands of the American student, practitioner, and sanitary officer a trustworthy guide to the principles and practice of preventive medicine. Also that he has sought to present the essential facts upon which the art of preserving health is based, in clear and easily understood language. Lastly, that whilst he cannot flatter himself that much in the volume is new, he hopes nothing in it is untrue.

The book opens abruptly without explanation or introduction, with the chapter on air, including a brief exposition of the composition of the atmosphere, the influence of changes of temperature upon health, and similar topics. The important subjects of water, food, soil, removal of sewage, construction of habitations, hospitals, and schools are next treated, after which succeed chapters on industrial, military, marine, and prison sanitation. A short section comprising personal hygiene is followed by a discussion of the germ theory of disease, the history and prophylaxis of particular contagious or epidemic diseases, and the volume concludes with a consideration of antiseptics and disinfectants, quarantine and vital statistics, to each of which a few pages are devoted.

The author writes in a pleasing and agreeable style, and his descriptions of modes of investigation in the earlier, and of diseases with their prophylaxis in the latter part, are, as a general rule, clear, concise, and accurate. The great fault of the work is that of omission, and although no doubt this is the result of our author's praiseworthy attempt to condense the essentials of the most important branch of all human knowledge into one small treatise, it would not be difficult to point out matters of vital interest to every sanitarian, which should have been discussed in its pages. Absence of specific details in regard to testing for adulterations in the chief articles of food, or of impurities in air and water, is much to be regretted. In fact, Dr. Rohé seems quite ignorant of the great test for dangerous organic impurity in water, which we possess in Nessler's reagent, a test of such delicacy and value that, according to Wanklyn, no other can even compare with it. The scanty reference to methods of microscopic investigation, and the total want of illustrative figures, also constitute serious defects, which will no doubt be remedied in future editions of this very useful work.

An admirable feature of the book, and one which goes far to compensate for the evils of excessive condensation, is the excellent list of references appended to each chapter. By the aid of these, students who are blessed with ample time and abundant pecuniary resources can fully inform themselves upon any particular question relating to the present state of sanitary science.

J. G. R.

ART. XXIII.—*Bodily Deformities and their Treatment, a Handbook of Practical Orthopædics.* By HENRY ALBERT REEVES, F.R.C.S.E., Surgeon to the Royal Orthopædic Hospital, to the East London Children's Hospital, and to the Hospital for Women; Senior Assistant Surgeon and Teacher of Practical Surgery at the London Hospital. Small 8vo., 450 pp. Philadelphia: P. Blakiston, Son & Co., 1885.

IN examining a work of this kind, it is but justice always to keep prominently before the mind the exact limitations set for himself by the author. This will appear a still more imperative duty when we examine in detail

the extensive range of subjects embraced within the small compass of 450 pages, a distinct proportion of which are also occupied by the 228 illustrations, thus considerably lessening the text.

In his preface the author states that he has approached his subject from the standpoint of the general surgeon. Herein both reader and patient are to be congratulated, for we hold that he only should be a specialist who, first having had a considerable experience as a general practitioner or surgeon, by some special aptitude, or from the force of circumstances, gravitates, as it were, into some special line of practice. Recognizing the patent fact that no one comprehensive work on Orthopædics, in its modern sense, has been as yet written, although many good works are extant treating of the various sections of this branch of surgery, Mr. Reeves has attempted to fill this acknowledged want by a comprehensive, concise, and cheap practical work, founded on "a large special and general experience," and, considering the almost insuperable difficulties of such a task, we must confess that he has acquitted himself admirably.

Although there are of necessity omissions, faults, and errors, we consider the book a good one, and chiefly because, while sufficiently magisterial, it is an eminently *suggestive* work, in that, while distinctly advocating the author's special views, it gives in a succinct way such hints and actual statements of the views of other authorities, that the reader is at once put in the possession of an excellent general idea of the subject, and sufficient data to enable him readily to push his researches further, should he see fit.

When we mention the various subjects treated of in this book, it will at once become manifest that we cannot notice each in detail. We shall, therefore, confine our remarks to those points which seem to us specially deserving of praise or blame. The work opens with a brief chapter on orthopædics in general, which judiciously omits anything like a history of the art, but gives appropriate references to the sources wherein such information should be sought. This chapter includes a general consideration of the causation of deformities, their prophylaxis, and the general principles governing their treatment.

Rickets surgically considered is sufficiently well treated of, except that we must protest against such an exceedingly crude pathological description of its first stage as the statement, that the bones "are infiltrated with a blackish, bloody matter." Such a description is certainly no aid to an understanding of the method of invasion, the cause of the deformities in, and the means best calculated to relieve and cure this disease—rather, indeed, the reverse.

A noticeable and commendable feature of this work is that the French, German, Latin, Greek, and English synonyms of the various affections are given immediately after the definition of each disease. A congenital and acquired form of scoliosis is recognized, the latter being due to idiopathic, traumatic, rachitic, inflammatory, or statical causes. The noteworthy points as to the author's views of the pathology of this affection are that he believes that some few cases "can only be satisfactorily explained by altered growth or ossification in the affected portion of the spine," and "that in many cases the causes are manifold rather than single and simple." Careful perusal of the text gives us the impression that the author has no very definite belief as to the causation in many cases, with the exception of those mentioned, and that "vertebral articular disease" is an occasional cause. His remarks on the diagnosis of scoliosis are judicious and trustworthy, but we cannot agree with him that any degree of "double

curvature" of the spine can exist to which the surgeon's attention would be called, without torsion of the spine, as he seems to suggest does occur. Our reasons are anatomical and mechanical, but cannot be entered into here. It is possible that Mr. Reeves means that this torsion cannot readily be made out in certain cases, in which opinion we concur. Under treatment, active and passive gymnastics, especially swimming either "wet or dry," auto-suspension, etc., are judiciously described and advocated for selected cases. Mr. Reeves thinks it is "a pity" that we seem to have entirely given up the use of orthopædic beds. Lund's recent couch, lateral decubitus by the aid of pillows, or, still better, by Wolff's suspensory cradle, are strongly recommended, and, we think, deserve commendation. As to spinal supports and corsets, he is an utter disbeliever in the efficacy of the elastic traction of Barwell, and condemns the plaster jacket as ordinarily applied, but believes that in hospital practice, where expense is an object, the following modification of Sayre's apparatus is serviceable in certain cases of incipient lateral spinal curvature. Thick pads are placed in the concavity of the curve before the jacket is applied. When set, corresponding holes are cut out of the jacket and the pads removed, thus "leaving room for expansion of the chest and of the concavity of the curve."

Although Mr. Reeves has devised a modification of the ordinary spinal support which is, in his opinion, a "perfection, though not, perhaps, a perfect instrument," we shall quote the following emphatic sentences as the best expression of his opinion concerning spinal apparatus: "I wish it to be clearly understood that I look upon spinal instruments only as valuable adjuncts; if they be trusted to alone, disappointment will be the result." Would that all other orthopædists were as moderate in pressing the claims of their own methods, and were as truly scientific in their views of treatment!

Forcible rectification of the spine, the author thinks, may prove useful in a very few selected cases, and he proposes to try it. We think that he had better not. Deformities of the chest and abdomen are next briefly considered. Wry-neck is described as being permanent, intermittent, spasmodic, symptomatic or essential, osseous, and articular. Judicious advice is given as to treatment of each variety. The author's experience of five cases of stretching, or excision of the spinal accessory nerve before or after tenotomy, leads him to view the operation unfavorably. The chapters on cyphosis and lordosis present no points of special interest.

The section on spinal caries is an excellent one, wherein the writer says, "I freely admit that injury may frequently be the actually known or the unrecognized cause of the disease," but "I cannot admit it as the only cause, and to the exclusion of others due to local and constitutional states." He admits that when force is "transmitted through the ribs to the vertebral articular facets," it is "probable that an arthritis is set up which may spread through the processes to the vertebral bodies, and thus cause the disease. Of this I am sure, that in considering cases of spinal caries, we too often overlook the undoubted fact that disease of the vertebral joints may coexist, or even be independently present. . . . Tubercle and syphilis are not infrequent causes of the disease; and osteitis with cheesy degeneration may follow the continued fevers, or be due to the vital depression from some long or serious illness." It will be gathered from these quotations that this judicious author is no extremist, neither a traumatist nor a constitutionalist, if we may so term it; but a truly broad-minded clinical

observer, one who allows no preconceived opinion to stultify the teachings of his own experience. In addition, Mr. Reeves believes that the caries may commence peripherally, *i. e.*, as a periostitis, or centrally, *i. e.*, as an otitis of the vertebral body. *Caries sicca* is recognized, and considered to be due most commonly to gout or rheumatism. Primary disease of the intervertebral fibro-cartilages is thought to be very rare.

A case quoted from Gibney will afford comfort to some of the unfortunate general practitioners who are sometimes unjustly blamed by specialists for not detecting spinal caries in its earliest stages. On this patient five diametrically opposed diagnoses were made, and when reported the sixth could not be made, as no opinion could be arrived at! We do not quote this to encourage carelessness, but to afford comfort to those finding it difficult to arrive at a correct conclusion in doubtful cases. In the treatment, Rauchfuss's spinal cradle is recommended for certain cases. Rest in bed with a moulded leather, felt, or gutta-percha back-splint should be persevered in, either continuously or for a certain portion of the day, until ankylosis is far enough advanced to allow of locomotion alternating with recumbency, when a spinal support should be worn.

Mr. Reeves considers Sayre's jacket dangerous when the disease is active, or when there is much destruction of bone.

"In hospital practice," however, "where time and expense are objects, and in cases in which ankylosis is proceeding favorably, I think a jacket a cheap and efficient support, if properly applied; but I would do away with extension altogether in spinal caries, because it is mischievous in the active, acute, and destructive stages, and when ankylosis is proceeding it is not necessary, and may be harmful."

We heartily indorse the above, having entirely abandoned suspension, resorting instead to the hammock when applying a jacket.

Posterior incision of spinal abscesses with the removal of carious or necrotic bone is mentioned with a qualified commendation, the procedure being still on trial and sometimes impossible to complete even by those somewhat experienced in this operation.

As was to be expected, much space is devoted to the discussion of talipes in all its forms. Some interesting statistics, drawn from many sources, are given of the actual frequency of club-foot among the new-born, and the relative frequency of the different varieties. Mr. Reeves's personal experience of the congenital forms convinces him that equino-varus occupies the first rank, then equino-valgus, next valgus and equinus, and last calcaneus. The etiology of both the congenital and acquired forms is most thoroughly but concisely discussed, and the conclusions at which the author has arrived can best be given in his own words:—

"At present the etiology of the subject is obscure, and the most that can be said is that the mechanical or malposition theory appears to be the more probable. I am inclined to think that the causes of club-feet are not single and invariable, and there can be little doubt that *acquired* club-foot, and such as those of which all experienced men must have had the opportunity of watching the development, are undoubtedly due to affections of the nerves, muscles, fascia, etc., so that, for my own part, I see no difficulty in believing that if the nervous system were disturbed during intra-uterine life, and affected the muscles acting upon the foot, these might readily induce alterations of the cartilaginous predecessors of the tarsal bones in the congenital forms."

Although the descriptions of the different forms of club-foot are good, and the directions as to treatment are, in the main, most judicious, we

shall only touch upon a few points here and there. Mr. Reeves inculcates the necessity of the "more gradual extension than in ordinary cases" for paralytic club feet when tenotomy becomes necessary, because massage, electricity, and proper apparatus do not improve them, lest the opposite deformity be induced.

Except in the slightest cases, Mr. Reeves thinks that tenotomy is absolutely necessary and other measures are a mere waste of time, although invaluable *after* tenotomy. In relapsed cases after tenotomy, when this operation is again performed, the blunt tenotome should be used in various directions, "especially up- and downwards" to separate the adhesions.

The author's modification of Scarpa's shoe is recommended, also Mr. Baker's apparatus. Although clumsy to an American eye, they are probably quite as effective as our more delicate pieces of mechanism. We are particularly pleased at Mr. Reeves's scientific fairness, which induces him to point out the indications for treatment, and while naturally preferring his own methods of carrying these out, still candidly admits that there are other plans which may also be equally efficacious. Tarsotomy in all its modifications is looked upon with no special favor, and should be restricted chiefly, if not entirely, "to neglected or badly relapsed cases of adolescents and adults." Even for such cases "the immediate rectification" "by multiple tenotomy or by open division" under anæsthesia is preferred, followed by fixation with a plaster bandage. Our personal experience certainly bears out the author in all except the "open division," of which we have had no experience, but which we shall certainly resort to before trying any form of tarsotomy. As Mr. Erichsen has said, many of these modern operations are at their best "surgical audacities," while some are, in the words of Mr. Jackson, of Sheffield, "surgical atrocities."

Many pages might be written containing much of interest concerning the author's able exposition of the many varieties of club-feet met with in practice, but we leave the reader to obtain this information from the original.

From the author's immense personal experience in osteotomy, the chapter on this subject is of especial interest, he having performed over five hundred operations of this nature. For reasons too many for recital, the author prefers diaphysial osteotomy of the femur for genu valgum to any of the other methods in vogue, having substituted it for his own "linear incomplete condylotomy." This latter operation, he maintains, does not result in the opening of the joint, although theoretically it ought to do so, and that the temporary joint effusion, which sometimes occurs, is rather the result of the force used in straightening the limb than due to opening of the articulation. Three points are especially to be noted with reference to incomplete condylar osteotomy: (1) to leave the wound alone unless there are some distinct indications for interference; (2) to commence passive motion early; and (3) not to *over-correct* the deformity, as is sometimes done.

Delore's method of "forcible manual reduction" meets with guarded approval for certain cases under twelve years of age and before the period of sclerosis in rachitic cases, but the disadvantages are the possibility of a weak and lax joint, and the frequent necessity of a retentive apparatus to permit of safe progression and also to prevent relapse. McEwen's supra-condylar incomplete osteotomy with chisels which constantly decrease in size is disapproved of, as such frequent introduction of instruments is apt to bruise the soft parts and so favor suppuration. The

author figures a graduated chisel or osteotome which enables the operator to judge of the depth to which it has penetrated the bone. This instrument was suggested by Mr. Parker, a colleague of Mr. Reeves at the East London Children's Hospital. The author also objects to Esmarch's bandage and antiseptic precautions during the performance of any kind of osteotomy. Mr. Reeves disapproves of Ollier's epiphysial chondrotomy, but thinks that possibly osteoclasia with improved instruments may "be permanently revived and practised."

Congenital displacements of the hip and lower limb are quite exhaustively considered. The pathogenesis of the former is considered to be different in different cases, both defective development—the commonest cause—and mechanical force in delivery being recognized as standing in a causative relation to this malformation. The chapter on deformities of the toes we think very defective in that their pathogenesis is either carelessly or ignorantly taught. The varieties are numerous, and the practical remarks, although perhaps lacking in clearness from their excessive conciseness, are fairly good.

Deformities of the upper limb, both congenital and acquired, form an interesting chapter. Dupuytren's contraction is thoroughly considered. The author states that not only the fascia but the skin and subcutaneous tissue are "considerably affected; whether secondarily or primarily," he does not decide. After giving a *résumé* of the opinions and experience of other surgeons—even quoting the histories of special cases—he concludes:

"that one should first try the subcutaneous plan, and if, in severe cases, this should fail after a fair trial, then one of the methods by open wound may be adopted, and if care be taken not to interfere with the tendinous sheaths, and to avoid injury to vessels and nerves, excellent results may thus be obtained."

The pathology and pathogenesis of "jerk, snap, or spring finger" are elaborately considered, but anything further about this rare affection must be here omitted lest this review exceed legitimate limits.

Anchylolysis and unreduced luxations; nervous deformities and muscular contractions, including infantile spinal paralysis and its consequences; deformities of the nose and ear; osteotomy for irremediable equinus; and trephining for Pott's disease close the very imperfect list of subjects which we have found space to notice, many subjects having been not even mentioned by name.

From what we have already said it will be seen that Mr. Reeves has, in a compact form, given us a trustworthy guide for the treatment of a very extended class of cases. We look upon the book as a valuable compend of orthopædics, although there are many minor points in which we markedly differ from the author. The cuts are, as a rule, miserable from the artistic standpoint, but we must confess they show clearly the points that they are intended to illustrate, which is more than many artistic drawings do. If the other volumes of the "Practical Series" are as good as this, we shall be agreeably disappointed; and we may be permitted to hope that their illustrations will be made artistic as well as clear.

C. B. N.

ART. XXIV.—*Health Reports.*

1. *Fourth Annual Report of the State Board of Health of New York.* Transmitted to the Governor Feb. 21, 1884. Pamphlet, pp. 442. Albany, 1884.
2. *Eighth Annual Report of the Board of Health of the State of New Jersey,* 1884, and *Report of the Bureau of Vital Statistics.* Pamphlet, pp. 375. Trenton, 1884.

1. THE *New York Report* opens with an apology for imperfections on account of the sudden death of the lamented Dr. Elisha Harris, Secretary and chief executive officer, in the midst of his usefulness, and before its completion. A satisfactory immunity from the more important epidemic diseases and material improvement over last year, in regard to all the preventable maladies, is noted, and attributed, no doubt correctly, to the systematic sanitary work accomplished by the State and local Boards of Health. The returns of vital statistics, however, although valuable, are admitted to be in need of more care to insure complete accuracy.

In regard to particular diseases diphtheria, whilst not developing as a widespread epidemic, has in several localities broken out suddenly, and been for a time quite prevalent. The mortality from it, proportionately very severe in some instances, has throughout the State been small as compared with former periods. In several notable cases the means employed to prevent a further extension of this dreaded complaint were eminently successful. So, too, with scarlet fever; the speedy and strict seclusion from schools of all persons connected with families in which cases occurred, the quarantining of the sick, together with the disinfection or destruction of whatever had come in contact with them, and the early and private burial of those who fell victims to the disease, have been attended with highly gratifying results. Measles has in some outbreaks been of exceptional severity, and formed the subject of special study. Typhoid fever has been the most prevalent of all the infectious diseases coming under the supervision of the Board, and yet in but few places has it existed as a considerable epidemic. The success of the Health authorities in stamping out what threatened to become a widespread epidemic of smallpox is worthy of particular notice. It originated entirely from one case of the malady, the subject being a passenger on the Lake Erie and Western Railroad. He was removed from the train, the car disinfected, and the occupants vaccinated. The disease was carried to the town of Hector and its vicinity through the medium of an occupant of the infected car, a lady of very advanced age, who was taken sick with modified variola at the residence of her son, with whom she was visiting, and to whom she communicated the disease. She had been allowed to go from the contaminated car unvaccinated, for the reason that she had suffered in early life from smallpox, a circumstance which forcibly illustrates the need there is for the utmost thoroughness in vaccination and re-vaccination. By the prompt action of local boards of health, a number of which were stimulated into organization in adjacent towns by the threatened danger, this epidemic, which gave promise of wide distribution in consequence of the large number of people exposed before the disease was fairly organized, was cut short. Such fortunate abbreviation was accomplished by taking active measures to quarantine infected districts, and to protect a large number of the neighboring inhabitants by vaccinations. As a gratifying

result of the vigilance of the State Board of Health in this and a few other instances, New York State has been unusually free from smallpox during the year.

An excellent illustration of the immense benefit derivable from sanitary investigations by local authorities may be found in the elaborate report on the Topography, Hydrography, and Drainage of Oak Orchard Swamp and Basin made by a committee, of which James T. Gardiner, Director of the New York State Survey, was chairman. Among the examinations into the causes of prevalent diseases in the State may be specially mentioned first, that made concerning the *Sudden Outbreak of Diphtheria at the Batavia Blind Asylum*, by Richard M. Moore, of Rochester, Sanitary Investigator for the west district, in which the probable origin was traced to sewer-gas from an untrapped bath-tub near the bed of the boy first attacked. A second valuable report in this series is the one made by Dr. F. C. Curtis on a *Sudden Outbreak of Enteric Fever at Port Jervis during the Fall of 1883*, in which a very careful and searching examination (a model for similar investigations), showed that the cause of the epidemic was infected milk, which was known to be supplied to eighty-seven per cent. of all the patients attacked. A very interesting article on *Milk Fresh and Condensed*, contributed by C. E. Munsell, Ph.B., one of the State Inspectors of milk, contains, among other evidences of faithful attention to the duties of the office, the gratifying statement that at the present time only about one can of milk in forty comes to the city watered, whereas a few years ago nearly one-fourth of the 500,000 quarts of alleged milk consumed in New York City was water. Mr. Munsell declares analyses are not generally made, as the lactometer is positive evidence of adulteration by water if nothing else is added, or if the cream has not been removed. He also asserts that the minimum total-solids standard of 11.5 per cent., adopted by the British Society of Public Analysts, is too low, as it allows the removal of one-third the cream from average milk, as well as the use of refuse or putrid feed for the cows, since nothing besides distillery swill has been found to produce milk below that quality. After some valuable reports respecting the action of the Board in relation to sundry nuisances, especially that created by the Glen Cove Starch Manufacturing Company, the volume concludes with an interesting article by Edward W. Martin, Milk Inspector, on *Milk and its Adulterations*, which is illustrated by some reproductions of excellent micro-photographs, representing the lacteal fluid in healthy and diseased conditions.

2. The *New Jersey Report* also expresses gratification that the year 1884 has been one of comparative healthfulness throughout the State, and that the more intelligent citizens, and those who have the most to do with the moulding of public opinion, are more and more realizing that the health of the people is a vital consideration as to the public prosperity. The subject of water supply is briefly considered in the report of the able secretary, Dr. E. M. Hunt, and the statement made, that whilst pure water has been obtained by bored wells driven under skilled advice, in several of the more important sea-side resorts, such as Cape May and Asbury Park, much foul water is still imbibed. Within thirty miles of New York City is to be found half the population of the State of New Jersey. Of this number, according to the careful and discriminating judgment of engineers, chemists, physicians, and boards of health, not one-half are supplied with water fit to drink. In regard to the important question of the disposal of house waste by emptying it into streams, a remarkable experiment has been tried

at Newark, where an effort was made to collect the sewage in a ditch, and then by the aid of water impounded at high tide, to wash it out as the tide fell. This attempt, carried out at an expense of \$75,000, utterly failed, as had been predicted by Dr. Hunt. The attention of the Board has been more than ever turned to effluvium nuisances, and it is urged that foul odors from pig-pens, slaughter-houses, bone-boiling works, and other offensive factories, should not be allowed to escape within several hundred feet of dwellings. The secretary asserts, as an ascertained fact, that nausea, diarrhoea, and an extra demand for vital force, are the results in many cases, and that when some special contagion alights or an epidemic occurs, the districts nearest to such odors, and especially persons who are newly brought in contact with them, are most likely to suffer severely. The dealing with petroleum sludge in order to recover from it the sulphuric acid, and the use of crude sludge for the manufacturing of fertilizers, also occasion much nuisance, which has been partially mitigated by the efforts of the Board. The authorities have been duly alive to the important subjects of the hygiene of schools and penal institutions, in which careful inspections have been made and judicious changes recommended.

Several pages are devoted by Dr. Hunt in his general report to *Cholera and Precautions Against it*. Since it is not deemed probable that the United States will escape invasion by cholera another year, he advises that water supplies and pipes, etc., for removal of waste should be at once inspected, and any faults therein corrected. Also, that personal cleanliness should be strictly enjoined. Arrangements ought to be made for promptly reporting the first case in any locality in order that thorough isolation and disinfection shall immediately be practised. As an encouragement to diligent attention in this respect, it may be stated that in four late epidemics in India there were 154,986 villages attacked. But in 58,972 of these there was only one death, and in 20,596 there were only two deaths. Yet the fact that in these years the total mortality from cholera in India was 1,380,226 shows how fearfully destructive it is when it finds all the requisite conditions, or is not guarded by efficient sanitary police.

The first essay is one contributed by E. H. Janes, M.D., Assistant Sanitary Superintendent of the Health Department of the city of New York, on *What Legislation is Desirable for the Improvement of Tenement Houses*, and contains some excellent suggestions in regard to ameliorating the miseries of the poor creatures who inhabit these foul and dangerous dwellings. The next article on "Water supply," by the Secretary, Dr. E. M. Hunt, is filled with judicious advice which is now, in view of a cholera epidemic, doubly important. The frequent testing of drinking water is especially urged, and the convenient Heinsch's test for sewage contamination recommended as follows: Fill a clean pint bottle to three-fourths of its capacity with the water to be tested, dissolve in it half a teaspoonful of pure white loaf or granulated sugar, and keep it in a warm place for two days. If before the end of that time the fluid becomes cloudy or milky it should be rejected, whilst if on the contrary it remains clear for forty-eight hours, it is *probably* fit for domestic use. In an interesting essay on *Filtration*, by Prof. George H. Cook, the author maintains that, whilst the benefits arising from the filtration of water have been proved by many satisfying experiments, the chemical or mechanical changes which it undergoes are not well understood. Analyses of water before and after filtration generally show a small diminution in the

amounts of organic matter, not, however, by any means sufficient to explain the improvement which appears to have taken place in the properties of the fluid. Dr. Hunt, in his useful *Notes upon Popular Health Resorts*, gives an encouraging account of the progress in local sanitation made during the past six years, and furnishes data in regard to the present condition of various watering-places which it would be well for every physician to consult before sending patients to the many invaluable resorts upon the New Jersey coast. We are glad to see that Prof. Albert H. Leeds, Chairman of the Committee of Analysts, in his general report renews his expression of confidence in the legal standard of 12 per cent. total solids for pure milk, and is still of the opinion that to debase this standard would be to legalize the traffic in watered milk. *Methods of Butter Analysis*, by Prof. H. B. Cornwall, is an elaborate review of the questions involved, in which the author concludes that Reichert's modification of Helmer's plan for determining the fatty acids is the only one yet devised which is capable with any practical degree of accuracy of distinguishing between coconut oil in mixtures or alone, and pure butter fat. Reprints of circulars and laws relating to health, with elaborate statistical tables, conclude the volume, which, as usual, forms a valuable addition to the working library of any practical sanitarian.

J. G. R.

ART. XXV.—*The International Encyclopædia of Surgery. A Systematic Treatise of the Theory and Practice of Surgery by Authors of Various Nations.* Edited by JOHN ASHURST, JR., M.D., Professor of Clinical Surgery in the University of Pennsylvania. Vols. IV. and V. 8vo. pp. xxiii. 987, xxxvi. 1207. New York: William Wood & Co., 1884.

VOLUME IV., with the exception of an article on Tumors, is devoted to the bones, and claims more particularly the attention of the general surgeon. The authors are but few in number, but are all men whose names are well known both in this country and Great Britain, and it is a matter of congratulation that the important subjects with which they deal have not been compressed into the narrow limits usually found necessary to keep a work of this kind within bounds. Even here, one feels that the authors have had none too much room, the tendency of large works of reference like this in the English language being in the direction of too great condensation; a fault in agreeable contrast with the prolixity of continental works, but one nevertheless too frequently noticed by those who have occasion to study the literature of a given subject.

The opening article is upon *Injuries of Bones*, and is from the pen of a writer whose name is intimately associated with that subject in this country—Dr. John H. Packard. This is not a department in which any recent triumphs are to be recorded, and the task of the author consists chiefly in carefully digesting and assimilating the experiences of the profession in certain modes of treatment which have had an opportunity of enjoying an extended trial.

We are glad to see that he ranges himself upon the side of those who do not regard the plaster bandage as the sum and substance of the treatment of fractured bone, and that he recognizes the necessity which all severely injured parts feel for rest. "Fractures of the lower extremity,

as a general rule, involve a long confinement to bed," is an opinion which a few years ago could not have found favor with surgeons of progressive tendencies; but we think a further trial of the early stiff bandage treatment has been followed by a considerable diminution in the number of its advocates. It possesses the great disadvantage of concealing changes upon the surface which develop with the first inflammatory reaction, and sometimes become most important factors in the treatment of the case. Although an excellent extension and counter-extension can undoubtedly be maintained in this way, lateral motion cannot surely be prevented, and considerable deformity thus becomes possible as the limb shrinks and becomes loosened in its casing. This is particularly true of fractures of the forearm and elbow, which have been treated with some of the numerous forms of material which are moulded to the part. The author is an advocate of passive motion, which he specially dwells upon in the treatment of fracture of the elbow-joint. This is in opposition to the views of one of our most prominent authorities in this country. The old-fashioned method, which consisted in pumping a joint for some weeks immediately following the removal of the splints, has, we presume, few supporters to-day. The great majority of joints that have been well set and cared for can, with proper directions for exercise, be intrusted to the patient or to the masseur. There are, however, certain joints, like the shoulder and the humeral end of the radius, whose work can to a certain extent be done for them, as in rotation, and in which ankylosis is more liable consequently to become permanent. We have seen several cases where rotation of the radius was lost after fracture at the elbow-joint, in which no injury to the radius had occurred. Early attention to the movements of the bone must have obviated this. On the other hand, flexion of the elbow will surely return without a particle of passive motion, if the condyles have been kept in their proper places. In reading that portion of the article devoted to fractures of the upper portion of the femur, we were surprised to see so little said about one of the most common forms of injury of this region, namely, impacted fracture of the neck into the trochanter. There is the usual discussion of the intra-capsular and extra-capsular fractures, which seems to us to have no very important practical bearing. How often does one meet with an ununited fracture of the neck of the femur? On the other hand, the impaction which occurs when old people fall upon their trochanter is often passed unrecognized, or, if discovered, is subjected to an unnecessarily long and tedious treatment.

As to the different varieties of splints advised in the treatment of fracture we have little to say; every man works best with his own tools, and although we should not in all cases imitate the author, we can cordially recommend his advice as being based upon sound principles; we should have been glad to see a little more space devoted to the subject of the treatment of union with deformity, the operations for subcutaneous osteotomy, the wiring of bones for non-union, but we presume the exigencies of the case precluded a more extended treatment of these subjects.

The article on *Diseases of the Joints* is by Mr. Richard Barwell, of London, already favorably known to readers of the Encyclopædia in connection with aneurism. This is a learned and carefully prepared chapter. The author divides joint disease into simple, dry, suppurative, strumous, rheumatic, and gouty synovitis; the articular forms of osteitis, and affections of the joint due to syphilis and nerve disease. Hip disease is treated separately from the other forms of strumous disease, presumably for the

purpose of bringing the discussion of mechanical treatment at the end of the article; but this arrangement disregards scientific accuracy, and is not wholly in keeping with the dignity of the work. The most interesting section to surgeons is that part devoted to ankylosis, which, however, is exceedingly brief; much too brief, we think, to serve as an accurate guide for those intending to perform some of the newly devised operations of osteotomy. The author's method of treating ankylosis of the knee-joint by section through the condyles of the femur, and in some cases through the head of the tibia and fibula, is of especial interest, and seems to promise more than any other of the numerous methods that have been brought forward. This question of osteotomy has become so important a one, and so many operations have been devised for each joint as well as for bone deformity, that a separate article on this subject would have been a very valuable feature of the work. We note that Mr. Barwell no longer employs Lister's dressing or the spray, the dressing being found too clumsy for accurate adaptation of the plaster bandage, but his substitute is none the less founded on careful antiseptic principles. He has a special predilection in favor of boro-glyceride.

The sections on *Neuroses of the Joints and the Arthropathies* are of special interest.

When resection was substituted for amputation in injuries and diseases of the joints, it was thought that one of the greatest advances in modern surgery had been achieved. During the past quarter of a century this operation has had a most extensive trial. Many improvements and modifications have been introduced, most of which have been designed for the purpose chiefly of securing a still greater economy in the preservation of parts. This conservative tendency has shown itself latterly in a reaction in certain quarters against the operation itself as involving an unnecessary sacrifice of portions of the joint which have not been subjected to injury or disease, and it has been even boldly asserted that resection of joints as at present practised would soon become an operation of the past.

The carefully prepared article by the editor of this work, Professor Ashhurst, embracing statistical tables, and many cases with results contributed by the author, is valuable testimony in favor of the operation. His views on this question may be summarized by a quotation from his comments upon certain substitutes proposed for excision of the knee, which consist either in application of mineral acids to the diseased portions of the articulation, or in laying open the joint and scraping away the diseased structures. He says: "But the results of these methods have not been uniformly favorable, and excision has been found so satisfactory in my own hands that I have not felt tempted to abandon a tried and proved operation for a procedure which, at best, has not as yet been shown to be an improvement." He does not hesitate, however, to content himself with removing a very thin layer of bone with the saw, "and then to attack any remaining patches of caries or necrosis with the gouge, osteotrite, or trephine."

Excision of the hip-joint is perhaps as unlikely to be attended by a favorable result as that of any other joint, the mortality being chiefly due to constitutional conditions, as the author shows. He is, however, able to present several favorable results, one in a patient twenty-one years of age, and another of double excision being especially worthy of mention.

The amount of bone which should be removed depends in part upon the amount of disease, but also on the necessity for drainage. Removal

of a portion of the trochanter may thus become necessary in order to make possible the healing of a pus cavity forming about the head of the bone. So with the malleoli in excision of the ankle-joint, it becomes necessary to sacrifice sound bone to leave the part in a shape favorable for repair. In reading statistics of this class of operations it is important to have a thorough understanding about the age of the patient in order to estimate the operation at its proper value. The prognosis of resection in a child may be *couleur de rose*, and the result of the same operation in the adult most disastrous. This is perhaps more true of the ankle than in any other joint. Professor McLeod, of Glasgow, once asserted in our hearing, in the most categorical manner, that resection of this joint for caries in the adult was never successful, and we are beginning to come round to that opinion after a considerable experience. On the other hand, with what pride does the medical periodical writer point to a row of little patients who have undergone the ordeal! The results are, as a rule, most excellent, but there is always the prospect of cure in these cases without operative interference. Decidedly we have not yet got at the "bottom facts" of this operation. Dr. Fenwick's method of excising the knee-joint by cutting a groove in the head of the tibia, into which the pared condyles of the femur are set, a very ingenious operation, is described in a chapter by itself. A table of twenty-eight cases gives but one death and two amputations, but it should be stated that no patient was over fourteen years of age.

We looked with considerable interest to the chapter on *Tumors*, for in English publications this department of a surgical work is usually one of the weakest points; this cannot be said in the present case, for Mr. Butlin, of St. Bartholomew's Hospital, has produced an article of high quality, and eminently well adapted to the *Encyclopædia*. We are glad to see that St. Bartholomew's has among its present generation of surgeons a successor to the work so brilliantly begun by Sir James Paget. The author makes some interesting observations on the theory of the parasitic origin of tumors. He calls attention to the close resemblance of the processes of the malignant tumors to those of certain of the infection tumors, especially tubercle; to the objection that tumors are not inoculable, he states that probably the difficulty of carrying out inoculation experiments successfully is much greater than is usually supposed. Any one who has read the recent investigations of Ogston and Rosenbach on the micrococci of pus, will have some idea of the character of the obstacles to success, and why the experiments hitherto made may not have succeeded. The exceedingly interesting observations on the development of lympho-sarcoma in the lungs of the cobalt miners of Schneeberg, and the immunity of all persons in the neighborhood not employed in the pit; the researches of Haviland on the geographical distribution of cancer—all help to prepare one for the statement that "the rapid advance in the knowledge of micro-organisms will lead, ere long, to the discovery of tumor parasites." The classification adopted is the anatomical one. They are divided into two great groups, the connective tissue and the epithelial tumors. This plan will undoubtedly survive all other improvements until some great discovery like that which we have just hinted at will let in a flood of light upon their origin and the laws which govern their development.

Mr. Butlin divides lymphatic tumors into two varieties, the lympho-sarcoma and the lymph-adenoma, or Hodgkin's disease. As both of these are malignant, it seems curious that the author should see fit to separate them,

and yet fail to recognize the existence of a pure lymphoma, or an hypertrophy of the gland of a benign character. The hospital surgeon certainly meets with growths that cannot be called scrofulous or tubercular, and at the same time have no malignant tendencies. Whatever the etiology of such a growth may eventually prove to be, we shall find it most convenient in the mean time to recognize such a variety.

That portion of the article devoted to carcinoma is of special merit; the rarer forms of cancer of the breast, as Paget's disease and true scirrhus, are represented in two very perfect plates; portraits are also given of two cases of rodent ulcer. The following quotation will show that the author is fully abreast of the times in his views on the treatment of cancer:—

“But those who expect most from the operation sweep the tumor and the breast completely off, together with a very wide area of integument, and not content with removing axillary glands which are decidedly enlarged, search the axilla when no enlargement can be felt, and remove all the glands which can be found.”

The contribution on *Injuries of the Back*, by the late Dr. John S. Lidell, is, like his work already noticed in a previous volume, of the highest order of excellence. It is characterized not only by the collection of a large number of interesting cases drawn from the writer's own experience, but by a critical study also of the work of others, among whom may be especially mentioned Hilton and Erichsen. The work of Page on the railway spine had not, at the time of writing, appeared, and the reaction which has since set in against the views of Erichsen had not consequently manifested itself sufficiently to demand the notice which it would now obtain in an article on this subject. In every other way the work done by the writer is of the most thorough and modern type. We have found the sections on sprains, twists, and wrenches of the back most valuable and interesting reading. Such writings are of the greatest assistance to the surgeon in clearing up the diagnosis of many obscure forms of injury. The views of the author on the neuropathic origin of bed-sores forming after some of this class of injuries, and of inflammation of the kidneys and bladder, deserve particular attention. In the portion devoted to gunshot injuries, the great experience of the author in the department of military surgery is shown to the best advantage. We must also say a word of praise for the excellent literary style which pervades the work of this writer.

The volume concludes with a chapter on *Malformations and Diseases of the Spine*, by Mr. Frederick Treves, of the London Hospital. This includes congenital tumors, the various curvatures, including Pott's disease. The text of this article is of good quality, but there is a deficiency of illustrations in subjects where illustrations might have been used to great advantage, and when some departure from the beaten track might have been attempted. There is indeed little to criticize unfavorably in this volume, which is fully up to the standard of its predecessors.

We come now to a volume which will probably be read by a larger number of physicians than any of the others, containing as it does the more strictly regional department of surgery. There are no less than fourteen contributors, among whom we regret not to be able to find a single Continental writer; not, indeed, on account of the quality of the work, for the high standard which has been preserved makes this volume one of the most interesting of the series, but because the original design of the publishers in bringing together the writers of France and Germany with

those of England and America, might have been more fully carried out. At least the work of one French writer is promised in the final volume, and we trust the list of authors will prove to be more in keeping with the title.

The opening article is upon *Injuries of the Head*, by Dr. Charles B. Nancrede, of Philadelphia. This is not an easy subject to write about, not only for its inherent difficulties, but on account of the very long list of eminent writers who seem to have exhausted the field. The author, however, has had the talent to infuse originality into his treatment of a hackneyed theme. There is a liberal quotation of instructive cases, including many of personal experience. We shall allude to but two points in this valuable article. In regard to the nature of concussion, the writer ranges himself with those who believe that there is probably no such thing as "cerebral vibration without visible lesion," and he feels strengthened in this view by the observations of Duret on the pressure exerted by the intra-ventricular fluid, and the concurrent vaso-motor changes. A rupture in the floor of the fourth ventricle or a vascular disturbance may be detected when no actual extravasations of blood have taken place. We would, however, call attention to the fact, that later German writers (Groeningen and Blumenstoch) have not confirmed these observations, and that the former of these two authors states that the most marked symptoms of concussion can occur without the discovery of lesion by the most careful post-mortem examination. Thus, with the lapse of time, old theories once more have become fashionable.

The sudden notoriety which the fissure of Rolando has attained naturally draws attention to that part of the article which treats of the localization of cerebral lesion, and we are glad to be able to record that the author cannot be accused of having been caught napping upon this department of his subject. Careful directions are given for determining the seat of the injury in the various combinations of paralysis. We give the concluding remarks upon this interesting question :—

"I would remark that the whole subject of cerebral localization is yet in its infancy ; that what has been said must be considered as provisional ; but that by the light already gained, a few surgeons have succeeded in operations, solely guided by cerebral topography, while more have been partially guided, as I have seen in two instances ; and that in the past, operations have been refrained from, and still more will be in the future, which a knowledge of cerebral localization may show to be useless."

Dr. Albert H. Buck, of New York, has contributed an article on *Injuries and Diseases of the Ear*. It is handsomely illustrated by chromolithographic plates, copied from Politzer. It is of a most practical character and admirably adapted to the wants of the general practitioner, as we can testify from personal experience. There is a clearness and simplicity of style which enable one to find easily the information one desires to obtain.

An equally valuable article, and one covering ground in which the surgeon is more directly interested, is that which follows on *Diseases and Injuries of the Nose and its Accessory Sinuses*, by Dr. George M. Lefferts, of New York. One of the affections of this cavity, for which the general surgeon is usually consulted, is deviation of the septum. We have therefore turned with some interest to the remarks of the writer on the management of this deformity, but are somewhat disappointed not to find a critical estimate of the various methods which have been proposed.

He has contented himself with a simple enumeration, but as he points out the disagreeable effects of a resulting artificial perforation, and speaks of good results attending persistent dilatation of the narrowed cavity, we are led to infer that he is disposed to favor the milder and earlier method of treatment to the many ingenious forms of operation which have lately been proposed. Another interesting feature of this article is the section on naso-pharyngeal polypi. We had supposed that the success attending Lincoln's use of the galvano-cautery loop had brought this method into favor, at the expense of the more heroic forms of osteoplastic resection of the jaw. A very concise summary is presented of these different methods, the preference being given to partial excision of the jaw, an operation which removes the palatine portion, but leaves the orbital and malar portions of the bone. The advantages claimed for this method are the removal of that part of the bone from which these growths frequently spring, the turbinated bone, and the subsequent accessibility of the parts to operative measures, in case of recurrence. These tumors vary considerably in their clinical characters from benign forms to decidedly malignant types. To the latter variety belong the sarcomatous growths, springing from the spheno-maxillary fossa, for which Langenbeck devised his admirable osteoplastic resection of the jaw, which enables the surgeon to get at the various ramifications. The more benign form may, on the other hand, be easily reached and removed by the platinum wire, even without ether or cocaine, and what is more important still, without deformity. A tendency to return may be controlled by subsequent applications of the galvano-cautery. Should the disease still prove obstinate, we have still the resection or excision to fall back upon. It should not be forgotten (a point by the way we believe the author has not alluded to), that after the twenty-fifth year this somewhat mysterious polyp which favors the male youth not infrequently disappears spontaneously.

An admirable sequence to this chapter is that on the *Mouth and Jaw*, by Mr. Christopher Heath. We are disposed to criticize one or two points, however, in this article. In the operation of removal of the tongue those methods are chiefly recommended which regard it as an erectile organ, whose bleeding vessels cannot be controlled. We are advised to try some of the various methods of applying the *écraseur*. We had supposed that Whitehead's operation had shown the inferiority of methods based on any such assumption, but we do not find the latter name even mentioned. We are aware that no man is a prophet in his own country, and it may be that distance has lent enchantment to our view, but the idea of regarding this organ equally adapted to certain surgical principles of treatment with many other parts of the body, appeals strongly to the mind. The problem appears to us to lie in the management of the parts. If an open mouth and position favorable for drainage of blood be secured, in a manner to be relied upon, the operation is robbed of its terrors, and this, it appears to us, is what Whitehead has accomplished. With this certainty in the mind one can deliberately remove with scissors and forceps such portions as may be desired, taking up vessels if necessary, as elsewhere. Travellers in the East still speak of men whose tongues have been cut out as a punishment, and who remain as proof that hemorrhage from this organ, even when left to nature, is not fatal.

In speaking of the operation for cleft palate, the writer leaves it to be

inferred that good results may be obtained in articulation, with practice. This is an error which Kingsley points out in the following chapter. We fail to understand why the latter writer, whose name is so intimately connected with the mechanical treatment of this deformity, has contented himself with referring in a few general terms to the different kinds of apparatus. A work like this should certainly be supplied with illustrations of some of the more successful forms of obturators, which constitute so distinct an advance in treatment. There is, perhaps, a lack of that surgical enthusiasm which animates the other writers of this volume.

The name of Dr. George H. B. Macleod, Professor of Surgery in the University of Glasgow, gives an additional interest to the article on the *Neck*, of which he is the author. This is a part of the body unusually difficult to write about, owing to the heterogeneous nature of the topics to be described, and the difficulty of treating them properly, without trespassing upon neighboring regions. It is hardly fair to criticize an article which has been necessarily much condensed, as this doubtless has been; this may, however, be an appropriate place to call attention to the opportunity which offers itself to the author, who may contemplate writing concerning this region on some future occasion, to depart from conventional methods and handle his subject in a manner both original and much more interesting. The topographical anatomy of the neck should be one of the important features of such an article. Something of this sort has already been attempted by König, and might greatly be improved upon. Nothing could be of more value to the surgeon than a thorough knowledge of the spaces in which pus burrows, and the routes which it habitually takes. A study of the development of the neck, which throws light upon the origin of cysts and fistulæ, caused by an imperfect closure of the bronchial clefts, is omitted here, as is usual in English and American articles, and is of great practical value as an aid to the diagnosis and treatment of the so-called hydrocele of the neck. It is but fair to say that our author is evidently familiar with the literature of the subject, but is satisfied to dismiss it with this remark: "Notwithstanding the ample discussion which this point has undergone, little reliable light has yet been thrown upon it, and consequently it would be fruitless to dwell upon it further." These criticisms pertain, however, to a small portion of this article, which bears throughout the flavor of an operator and writer of long experience. The portion devoted to tumors is of great practical value, and has many new and valuable illustrations, the discussion of the treatment of tumors of the thyroid gland being particularly good. We have little doubt that the editor would have gladly secured a subject of more portly dimensions from his pen.

Dr. J. Solis-Cohen's article on the *Air Passages* embodies all the recent advances in this special department, and adds greatly to the value and interest of this volume. To the surgeon, the section on tracheotomy in diphtheria, is naturally of great interest. Dr. Cohen is not an enthusiastic advocate of this operation. The observations made some years ago, on a service of five thousand operations, showed him that only one case in four recovered. He advocates with enthusiasm the inhalations of the steam of slaking lime, also evolution of steam in the immediate vicinity of the patient. We have often thought that the custom of bathing the patient in a constant moist atmosphere was a debilitating treatment, and that hot moist sponges, prevented from cooling too rapidly by keeping the blanket well up, were an equally effectual remedy. His

advice on the management of the canula is sound, and valuable to young as well as to many old surgeons.

Another interesting feature of this article is the table of laryngectomies, which number ninety-one. The list of deaths is most appalling to one who casts his eye rapidly over the list, but a more careful examination shows that death occurred in some cases long after the operation; one case is recorded as alive ten years later. On the other hand, one-third of the cases died within two weeks after the operation. An interesting illustration of the appearance of the parts after removal, and of the apparatus used for phonation, is inserted in the text.

One naturally turns with interest to an article upon the *Abdomen*. In the present case the author, Mr. Henry Morris, is not only a good writer, but an operator of considerable experience in this kind of surgery, the result being a production worthy of the occasion. Although something of a pioneer in this new field, our author does not allow himself to be too radical in his views on surgical progress. While surgeons are hesitating as to their duties in a case of penetrating gunshot wound of the abdomen, it would be well for them to read what he has to say about such injuries:—

“in which it is almost certain that more or less sloughing must follow about the edges of the wound, and in which the intestines are wounded in several points which would have to be sought for at the risk of dangerous and prolonged disturbance and manipulation, and some of which in all probability would be overlooked by the eye of the surgeon, though the officious inquisitiveness of his fingers might cause them to become the seat of effusion.”

Sound as this criticism may be, we venture to assert, nevertheless, that the number of surgeons who are prepared to place this class of injuries beyond the pale of abdominal surgery is comparatively small. Indiscriminate operating upon the kidneys is also condemned, although, as the author says, “the time has forever gone when the words with which ‘dear old Lawrence’ (to quote from a letter by a physician who had been his pupil) used to begin one of his lectures, namely: ‘the kidney, gentlemen, is fortunately beyond the reach of the surgeon,’ will find an echo of assent.” After laying down as a cardinal principle the rule of the first operator on the kidney, Simon, that extirpation is only permissible when a patient’s life is seriously threatened by disease and when all other remedies have failed, because renal disease is more dangerous in persons with only one kidney, he concludes with this statement:—

“It is probable that future experience will exclude from the category of cases for which nephrectomy by any method should be done, tubercular disease and renal sarcoma in children, as well as cancer at any period of life.”

The author looks upon the new operation of gastrectomy as still in the stage of experiment. “As yet the surgical mind is not settled either as to the condition for which the operation should be performed, or as to the precise steps of the operation; or, indeed, as to the justifiability, not to say advisability, of its performance.”

The editor has seen fit to make a number of interpolations, which, although valuable in themselves, are we hardly think of sufficient importance to offset their marring effect upon an article of such excellence. As in most of the English articles, there is a poverty of illustration, economy evidently having been practised at the expense of distant authors. We notice, by the way, two illustrations of intestinal fistula by Bourgery, incorrectly credited to Teale.

The concluding article on *Hernia* is written by Mr. John Wood, whose work has given such an impetus to the operation for radical cure. At present the senior surgeon of King's College Hospital, the successor of Ferguson and the colleague of Lister, with a quarter of a century's experience in the treatment of hernia, his work can no longer be considered as that of an experimenter, and the results which he has carefully collected and presented in this chapter must be regarded as probably the most favorable which skill and experience can produce to-day.

Mr. Wood's operation was, indeed, not received favorably by the profession, and many substitutes have been brought forward, but we find that he has not changed it in any essential detail from that method which he employed twenty years ago. In his first hundred cases there were three deaths, but since the operation has reached its present stage of perfection he has operated two hundred times consecutively without a single seriously bad symptom. Rather more than half have been seen and heard from, and of these the percentage of cure has been from seventy to seventy-five. In a table of fifty-five cases the oldest patient is forty years of age, the majority being young adults. Mr. Wood describes an operation for the cure of omental hernia, but appears to have used it in young children, and where such form of surgical interference seems unnecessary, owing to their tendency to cure by truss. "In the most common cases of umbilical hernia, attended with corpulence, a fatty condition of the omentum and general constitutional debility, these circumstances, as well as the age and habits of the patient, preclude an attempt at a radical cure." It is, however, in precisely this class of cases that the operation is most needed, for the truss often fails to retain the hernia, which eventually becomes irreducible or strangulated. It is in fact these aggravated forms of the affection in people who have passed middle life that have given hernia so bad a name. In many of the cases operated upon it is impossible to avoid recognition of the very favorable prognosis which they offer under the use of a truss. Once beyond the control of this apparatus, a very large percentage is found to be unsuitable for operation. While under the most favorable circumstances one case in every four is sure to be a failure, the operation can hardly be expected to become popular with that class of patients who can afford to provide themselves with a truss.

Mr. Wood's figures are of special interest, as they present results of long standing and are prepared with a care and honesty which have not always been accorded to such statistics.

We are surprised to find that he has so little to say about irreducible hernia and some of the mechanical modes of treating it. It has been the custom to regard many of these cases incurable, and many sufferers from Gibbon down to the present time have thought and still think themselves a reproach to surgery. A more detailed statement of what has been done in the management of this distressing malady would have been a valuable addition to the article.

The Encyclopædia has now so nearly approached completion that one can venture to make an estimate of the position which it will occupy in surgical literature. We think few will hesitate to agree with the opinion that it quite realizes the favorable expectations that were formed of it. French and German writers have produced treatises of greater erudition, but for the special purpose for which this work was planned they will not compare so favorably.

J. C. W.

ART. XXVI.—*Topography of the Anatomy of the Brain*. By J. C. DALTON, M.D., Professor Emeritus of Physiology in the College of Physicians and Surgeons, New York, and President of the College. Three volumes, 4to. Philadelphia: Lea Brothers & Co., 1885.

PROFESSOR DALTON's intention appears to have been to present a series of views, which, with the aid of brief descriptions, should show the topography of the brain. He gives in the introduction an account of the general plan of convolutions, and now and then he makes a digression from the description of a plate to dwell on certain parts; but there is no comprehensive chapter on the anatomy of the brain. The evident explanation of this course is that the plates speak for themselves, and are the pages of a book in which the competent reader will see the record of the shape, size, and relations of each and every part of the organ.

The method chosen is that of sections, which were photographed and reproduced by the heliotype process. We will speak of the plates first, and it is not easy to speak of them too highly. The first plate, showing the upper surface of the brain, is worthy of all praise. The appearance of convexity is excellent. One can follow a convolution as it runs along the surface and finally passes out of sight as one could on the brain itself.

In the views of the sections the distinction between the gray and the white matter is very striking, but more remarkable is the difference between the shades of gray in the three parts of the lenticular nucleus. One would hardly expect to see the striation of the gray of the convolutions about the calcarine fissure, but there it is beyond question. An admirable effect is obtained in sections in which a deeper part is seen through an opening, as in Plate IV., Series A, where the outer wall of the descending horn of the ventricle is cut through by the section, and we see opposite a part of the surface of the hippocampus. Even in the white substance the course of large bundles of fibres, such as the posterior expansions of the corpus callosum, can be made out in spite of the slight contrast they present.

Dr. Dalton's choice of series of sections for the demonstration of so complicated an organ is a sign of the progress this method has made. The advantages it possesses are absolute accuracy and clearness of representation. The chief, if not the only, disadvantage is the difficulty of understanding it. It might be logically presumed that the study of series of sections through the three chief planes of an organ or a body would suffice to give a perfect idea of the structure; but we know that something more is needed for most of us. The student, who, without previous knowledge of anatomy, could learn it by this method would certainly be exceptionally gifted. But we will venture to say that there are few well versed in anatomy, who, when they first saw sections, were not astonished at the new ideas they suggested. They have made much clear that was obscure before. This method is, no doubt, the best for a work of this kind intended for the proficient rather than for the learner, but we must admit frankly that even here some representations of dissections would have been welcome. It is true that there are some in the text, but we should have been glad to see them among the plates. The description accompanying the plates is necessarily fragmentary, and we regret that the author did not see fit to extend his account of the general plan of the convolutions to one of that of the whole brain. In spite of these shortcomings, which we surely have not understated, the sectional method must be admitted to be

admirable. It is particularly adapted to show the course of curved structures. How perfectly, for instance, a series of horizontal sections through the thorax shows the aorta arching over the root of the lung and gives its relations at every step of its course! In the same way these sections show beautifully the progress of the gyrus fornicatus, of the fimbriæ, and of the surcingle of the corpus striatum. If in some cases they tell their story only on cross-examination, in others they make clear at once what would take many words to explain. A student might be somewhat slow to understand how the convolutions of the insula and of the operculum "are intercalated with each other like the fingers of two hands clasped together," but some of the horizontal sections show the meaning at once. Vertical ones show how part of the cuneus is hidden in the calcarine fissure. Sections of the latter series show most beautifully the radiation of the fibres of the corpus callosum towards the surface of the brain, and the extra-serial horizontal section showing the course of the anterior commissure, and justifying the comparison to a Cupid's bow, is most striking. We must not omit to mention that there are many cross references in the text calling our attention to the same object shown in different series. The author observes that "a comparison of sections made in different planes horizontal, vertical, and longitudinal, will often corroborate or enlarge the information derivable from either of them alone." This remark applies to many points, but we would mention particularly the great ganglia of the base of the brain. We think most readers will rise from the perusal of this work with more accurate ideas of them.

The description of the convolutions in the introduction, to which we have already alluded, is a model description for clearness and brevity. We cannot imagine one more suitable in these respects for a text-book. We must be permitted, however, to dissent from the interpretation of the central convolutions. We fully agree with the author that the arched arrangement of the convolutions, which is so evident in brains of a simple type, like that of the fox for instance, is easily recognized in the human brain in spite of the disturbance due to the fissure of Rolando. We fail, nevertheless, to find any satisfactory evidence in favor of his theory that the course of the first frontal convolution is continued down through the anterior central convolution, up through the posterior one, and then along the superior parietal, through the occipital region, to the third temporal. According to this plan the third frontal convolution which is continued along the borders of both branches of the fissure of Sylvius is at one part of its course, to wit, in the operculum, indistinguishable from the first. In other words, the fold below the fissure of Rolando has to do duty as a part of each of these convolutions, and the second frontal is interrupted after all. We know of no convincing argument in embryology or comparative anatomy in favor of this theory. It is much more simple, and to us more satisfactory, to hold that the first frontal is continued along the median fissure of the brain above the fissure of Rolando, and the third along the fissure of Sylvius below it, and to admit that the second frontal is divided. It would seem that the author had been led to describe the central convolutions in the manner needed for his theory. He says that they become continuous with each other round the lower extremity of the fissure of Rolando, and says nothing of their equally constant union at its upper end. We wish, also, that he had mentioned the constant, though small branch of the parieto-occipital fissure on the convexity of the brain, as it is a useful landmark, and an important feature of the fetal brain.

Besides the introduction, the first volume contains ten plates representing the surface of the brain and longitudinal sections. The second volume contains fifteen plates (of which one is extra-serial) of horizontal sections, and the third, twenty-three of transverse ones. The sections in the second and third volumes are in regular order and at intervals of five millimetres. Each heliotype is accompanied by an outline bearing the explanations, than which nothing could be clearer.

In the too few digressions which the author allows himself from the concise description of the plates, he dwells particularly on the posterior curved prolongation of the corpus striatum, on the lenticular nucleus, the fornix, and on the parts that make the descending horn of the ventricle so difficult. We find repeated instances of Dr. Dalton's happiness of diction. When we read that the section has passed "a little to the hither side of the median plane," we think with a shudder in how many words some writers would have hidden so simple an idea. Once in a while we come across what appear to us inaccuracies, which are probably due to the fact that the author is describing coarse appearances rather than minute structure. The statement that the posterior commissure is the reverted border of the tubercula quadrigemina is an instance.

We hope we have said enough to show that this book amounts to a new demonstration of the gross anatomy of the brain, and that it is the work of a master. The skill with which the subject is treated, the number and the great beauty of the plates, the very full index, the handsome paper and printing, combine to make it a remarkable production. It is sure to add to the well-earned reputations of both the author and the publishers.

T. D.

ART. XXVII.—*Lectures on the Principles of Surgery.* By W. H. VAN BUREN, M.D., LL.D. (Yalen.), formerly Professor of the Principles and Practice of Surgery in the Bellevue Hospital Medical College, etc. 8vo. pp. vii., 588. New York: D. Appleton & Co., 1884.

THIS book will be gladly welcomed by those who in former years listened to the instructions of its author. It consists of some of the lectures which Dr. Van Buren delivered at Bellevue Hospital Medical College, and at the University of the City of New York, with both of which institutions he was connected for many years. They have been edited by Dr. Stimson, who, however, has not found it necessary to make any changes other than a few verbal ones. Of Dr. Van Buren's ability as a sound and practical surgeon it is unnecessary to speak. He has left a very definite personal impression upon American surgery, which owes to him, among other things, the best method yet devised for treating fractures of the femur; and as one turns over the pages of this volume there is found stamped upon each leaf the evidence of sound surgery, based upon extensive experience, and combined with accurate scholarship.

While in the steady onward march of surgical science, no one will look to lectures dating back a few years for the latest dicta upon mooted subjects, these utterances of Dr. Van Buren will be found to combine soundness of judgment and accuracy of observation, with such felicity of style and expression, that their perusal will more surely than is often the case

unite profit with pleasure. Indeed, we have rarely read a surgical work which is more interesting. John Bell has been credited with having produced the most attractive surgical work of his day, but its value was marred by the absence of an always wise discretion. These lectures may fairly be regarded as rivalling the work of the Edinburgh surgeon in interest, while the reader may repose with perfect confidence in their wisdom. Twenty-seven in number, they cover many of the most important subjects in surgery, and lay a broad and firm foundation of principles, upon which details of practice can be safely built. Although not professedly clinical lectures, there are interspersed many details of cases, which give the charm of narrative to their didactic instruction, and include many hints of treatment, derived from a wide and ripe experience, which are invaluable. Many of the chapters are worthy of special notice, but we must content ourselves with referring to the one which treats of Shock, as a model of thoughtful and thorough study of a most important subject, than which we are acquainted with none better.

But as the absence of novelty from the contents of this book makes it unnecessary to analyze it in detail, we have perhaps said enough to show our high estimation of it as a work in which the practitioner will most pleasantly refresh his knowledge of themes long since studied, and from whose pages the student may cull many valuable practical suggestions. It is a fitting memorial of a most finished and cultured surgeon, who played well his part, and whose loss will be long deplored. The book is well printed, and by the judicious use of italics it is easy to pick out the salient points of interest scattered through it.

S. A.

ART. XXVIII.—*A New Method of Treating Chronic Glaucoma, based on Recent Researches into its Pathology.* By GEORGE LINDSAY JOHNSON, M.A., M.B., B.C. Cantab., Clinical Assistant, late House-Surgeon and Chloroformist, Royal Westminster Ophthalmic Hospital; Medical and Surgical Registrar, etc. 8vo. pp. 48. London: H. K. Lewis, 1884.

THE object of these pages, the author tells us, "is to endeavor, by a process of inductive reasoning, to establish the truth of the following proposition, and to suggest a remedy for chronic glaucoma, which is not open to the objections inevitable to iridectomy."

The first part of his task is a comparatively easy one, as most practical ophthalmic surgeons have reached the same conclusion deductively, and will give melancholy assent to the proposition "that the ordinary method of treatment for glaucoma by iridectomy, though highly successful in acute forms of the disease, is nevertheless both uncertain and unsatisfactory in the chronic condition of glaucoma." Any new operation, with a sound pathological basis or a good empirical record, will meet with little opposition from prejudices in favor of present methods of treatment. A concise and interesting history of glaucoma, from early pre-ophthalmoscopic times to the present, is followed by an excellent description of the anatomy and physiology of the parts especially concerned in the disease, particularly the lymph spaces and channels, and the course of the fluid secreted by the ciliary processes.

In part second, on pathology, the author, after giving a *résumé* of the experiments and observations of Leber, Knies, Weber, De Wecker, Brailey, and Priestley Smith, concludes that—

“I. The interior of the eye is nourished by fluid elaborated by the uveal cells of the ciliary processes, and probably, to a small extent, by the pigment-cells lining the posterior surface of the iris.

“II. Under certain circumstances, hitherto not correctly determined, aqueous fluid may enter the anterior chamber directly through the trabecular tissue at the angle.

“III. All the fluid which does not enter the posterior chamber directly, circulates through the vitreous humor, and naturally through the suspensory ligament by way of the circumlental space, enters the anterior chamber, where it joins with the stream through the posterior chamber.

“The only possible means of escape for this fluid is by osmosis through the spaces of the ligamentum pectinatum (spaces of Fontana).”

In the following paragraphs he gives his view of the pathological conditions maintaining in acute and in chronic glaucoma :—

“Under certain circumstances the pressure in the vitreous becomes greater than in the aqueous chamber; this causes the lens, suspensory ligament and ciliary processes to advance in such a way that the angle of the anterior chamber is compressed, and the escape of lymph retarded. Inflammation and engorgement of the ciliary body and ciliary processes is the chief factor. The tension rises rapidly in proportion to the intensity of the inflammation, and acute glaucoma is the result.”

Under other circumstances the inflammation of the ciliary region is so slow and insidious as to fail to excite

“any acute symptom or marked increase of tension; but ultimately this inflammation passes into a stage of atrophy and sclerosis, and the contraction of the new tissue reduces the size of the circular sinus, and lymph channels around the angle, and generally so binds the iris by adhesions to the cornea, that the outflow of lymph is unable to keep pace with the inflow, and chronic glaucoma is the result.”

It is claimed that this difference in pathology satisfactorily explains the difference in the therapeutic effect of iridectomy in acute and in chronic glaucoma, that modern research and experience have shown that it is useless, in the latter form of the disease, to expect improvement from operating upon the anterior chamber, and that the vitreous offers a much better chance of success.

The operation advocated, which is called “scleral paracentesis,” consists in thrusting a double-edged, broad, thin knife through the sclerotic into the vitreous, towards the centre of the globe.

“The point of the knife is entered about 4 mm. behind the sclero-corneal junction, and should penetrate to the distance of about 1 cm. (nearly half an inch), the flat side of the instrument lying not quite parallel, but somewhat oblique to the long axis of the eye. Any part of the globe will do, but it is better to avoid transfixing one of the muscles, for obvious reasons. The knife is then very slowly withdrawn, and if the tension is high, slightly turned on its axis so as to allow the lymph freely to escape.”

The difference in principle between this operation and some other proceedings that have been tried, particularly Argyll Robertson's trephining of the sclerotic, does not seem to us so decided as it does to the author, but it has the advantage over them in simplicity and freedom from danger. The statistics, though not given in detail, and not very

definite, are encouraging as far as they go. The author states that he has performed the operation six times himself, has seen it performed by others in *about* ten cases, and has taken notes of the after-results of *nearly* as many others. "In several cases the sight has been improved; in all except one the tension was permanently lowered, while in none did the sight deteriorate subsequently." In two cases the acuteness of vision was brought to more than $\frac{3}{8}$, and remained so in one case several weeks, and in the other six months, after the operation.

If, in more extended experience, such a result as this can be obtained in two out of say thirty cases of undoubted chronic glaucoma, the value of the operation will be very great.

It is to be regretted that the author has allowed himself to give an air of originality and novelty to observations that are not new; and an English reviewer has called attention to the fact that, in many instances, he has not only adopted the views of Priestley Smith, but has availed himself, almost verbatim, of his means of expressing them. And then, too, the enthusiastic reader who has been led, by sundry references to the *denouement* in the earlier pages, to expect in operative therapeutics a discovery as purely inductive as that of the Davy safety-lamp, will experience a sense of disappointment when he meets, near the close of the book, with the incidental statement that the operation "was originally suggested by Mr. Cowell and Mr. Rouse." If inclined to be skeptical, he may suspect that the solution of the problem was accepted at second hand, and the inductive path to it discovered afterwards.

These, however, are questions between Mr. Johnson and his *confrères*, and while we may regret that his book is not more ingenuous, we can avail ourselves of its undoubted usefulness, even if only as a very good and very concise summary of the subject of glaucoma, whose literature has assumed such formidable proportions as to discourage most readers from undertaking to master it.

A colored diagram of the lymphatic and vascular systems of the eye, and several wood-cuts are well executed. The print is excellent, and the little volume is very neat, and in every way creditable to the publisher.

G. C. H.

ART. XXIX.—*Peruzzi Dott. Domenico. Nota sulla quinta centuria d'Ovariectomie in Italia, sulle operazioni affini e sulla Ooforectomia. The Fifth Hundred Ovariectomies in Italy, together with kindred Operations and Oophorectomies.* By Dr. DOMENICO PERUZZI, of Lugo. Extracted from the *Raccoglitore Medico*. Series iv. vol. xxii. N. 12-13. 8vo. pp. 27. Fior, 1884.

WE have reviewed the former statistical records of the author of this same series in the numbers of this Journal for Jan. 1881, Oct. 1882, and Jan. 1884, in the last of which will be found a summary of the preceding 400 operations. The present record covers the time from May 21st, 1883, to June 13th, 1884, and its cases are a fraction less successful than those of the last. There were 37 saved out of the first hundred, 64 of the second, 74 of the third, 79 of the fourth, and 77 of the fifth and last. The leading operator now is Prof. d'Antona, of Naples, who has had 33 of the

500, and saved 25 women. Dr. Peruzzi, who has operated 31 times, has no case in the last hundred. In success, Prof. Porro, of Milan, who has recently assumed a leading position as an ovariologist, takes the lead, having saved all of his 11 cases out of the last hundred, although, according to an established rule, one should not be counted, having died a month after the operation from pulmonary gangrene, attributed to embolism: there were extensive parietal adhesions broken up in the operation. 53 operators were engaged in the last 100 operations. The causes of death were septicæmia in 8, septic peritonitis in 7, shock (*colasso*) in 4, suppurative pelvi-peritonitis in 1, rheumatic entero-peritonitis in 1, intestinal occlusion in 1, and carbolic poisoning in 1,—23. The double operations were 10, followed by cure in 7: the simple ovariectomies 62, and those complicated by adhesions of a grave character 25. The remaining 3 were complicated with pregnancy, two of which aborted, and the third progressed to term. In no operation was the abdomino-vaginal drainage tube used; in a few, the abdominal, and in all, the treatment was Listerian.

Partial ovariectomies were performed in 12 cases, the operations not being completed because of insuperable adhesions in the pelvis, to the viscera, and the abdominal parietes. In all the cases, the portion of cyst remaining was united by sutures with the abdominal wound. Four women died, three of septicæmia and one of collapse.

There were 27 supra-vaginal laparo-hysterectomies, proving fatal in 17 cases. The exploratory operations were 10, with 3 resulting fatally.

The Oophorectomies (Battey's operation) of Italy now number 14, of which 6 were in the first half of 1884, 5 of which were by Prof. Chiara, of Florence, who operated by Tait's method (removing the Fallopian tubes) for uterine fibromas, and saved 4 cases. Of the 14 cases, 3 died. The operations were performed for hystero-epilepsy, hysterical mania, nymphomania, neuroses with ovarian disease, and fibro-myomata.

R. P. H.

ART. XXX.—*Diseases of the Urinary and Male Sexual Organs.* By W. T. BELFIELD, M.D., Author of *Relations of Micro-Organisms to Disease* (Cartwright Lectures, 1883); Pathologist to the Cook County Hospital; Surgeon to the Genito-Urinary Department, Central Dispensary, Chicago; Physician to the Oakwood Retreat, Geneva, Wis.; Professor of Microscopy, Chicago College of Dental Surgery. Wm. Wood & Co.: New York, October, 1884.

THIS book is the October issue of "Wood's Library of Standard Medical Authors." After a most careful perusal from title-page to finis we feel at a loss to decide whether the good or the bad preponderates. The work has evidently been written, not because the author had anything specially new to say, or that if left to himself he would ever have written such a book, but because he had been requested to do so by the publishers. Now it is not uncommon for most excellent, nay, standard works, to be written under such a stimulus, but quite as commonly the author only does himself an injustice. Dr. Belfield acknowledges in his preface that "he has been seriously embarrassed by the brevity of the period allotted for the work, which has permitted no opportunity for a minute scrutiny of

pertinent literature, for a careful revision of the text," etc. This latter omission is most unfortunately conspicuous. For instance, on page 244 the author says: "It is a singular fact that still-born children, even those born at full term, do not exhibit such (uric acid) infarcts." On the fourth line below this he again says: "In recent years it has, however, been demonstrated in repeated instances that such infarcts may be present in the kidneys of infants which have never-breathed," thus denying what he has just positively asserted. This may seem a captious criticism, but a reference to the text shows that, from the supposed fact of the absence of these infarcts in children who have never breathed, Virchow has regarded their presence as a medico-legal proof of the infants having been born alive.

As this work will probably have a wide circulation among those ill fitted to judge by previous experience as to its value, we feel reluctantly compelled to call attention to its manifest errors and shortcomings. On page 276 the author speaks of hot hip-baths at "30° to 33°," giving nothing to indicate the scale; but, of course, he manifestly means Centigrade, since at 30° F. the water would be *ice*! On page 299 he advises the "local effects of *a cold*" (the italics are in all cases ours) "douche to be obtained by the use of water, the temperature of which should be at first 30° to 33°, and may be gradually decreased, during three or four successive injections at the same sitting, to 25° or 20°." Manifestly the Centigrade scale must be meant here; yet how can "30° to 33°" in one case be hot and in another cold? Knowing the peculiarities of certain medical readers, we cannot regard the careless omission of the necessary C. or F. as a slight error. In another place he also speaks of hot injections heated up to "120°." We confess our inability to ascertain which kind of thermometer he uses.

Dr. Belfield in his preface also distinctly states that his chief aim throughout the work has been to render clear the cause of the morbid conditions rather than a "recognition of morbid symptoms only." We feel compelled to state that while we have risen from the perusal of this book in the possession of many *new facts*, we feel less able to make a diagnosis of the "*causes*" of the various phenomena than when we sat down. The reason of this mental bewilderment is clear. The work is written from a peculiarly German standpoint, with all the painstaking minuteness which so often characterizes Teutonic work. Dr. Belfield is like an inexperienced artist, who, having first made a rude and striking outline sketch of his sitter, easily recognizable by any tyro as an excellent portrait, is dissatisfied with its unimportant inaccuracies and erudeness. Accordingly, he proceeds "to work it up," and introduces every possible shade and variety of tint, with every conceivable accessory, until the most able connoisseur fails to recognize what special object the artist has been endeavoring to depict, although he sees "holes in the lace collar or the specks of snuff on the doublet."

This is precisely what the writer has inadvertently done. There is an immense fund of information; facts pathological, physiological, and surgical are supplied in such profusion as to render a thoroughly complete review impossible, so that no further analysis of the work will be attempted. Many omissions, a considerable number of errors, and the insistence upon some pet German theories to the exclusion of facts, rendered possible, we cannot but think, by want of an extended personal experience, mar the book.

Considering the large amount of knowledge on genito-urinary subjects, especially stone, gonorrhœa, etc., which we owe to the labors and writings of French, English, and American surgeons, the almost total absence of reference to their labors is strangely conspicuous.

The unfortunate competition between various medical publishers is flooding the market with numberless medical libraries, cyclopædias, etc., by "standard medical authors," which, instead of being the outcome of a ripe experience, and of years of labor and writing, are thrown off in a few months by ambitious aspirants for practice, who, if they had waited for time to ripen their knowledge, would in many cases doubtless produce works of permanent value.

We believe Dr. Belfield capable of work of so much higher character than the present, that we cannot but regret his having consented to publish this book, which, if pruned down, with theories checked by further experience, and having its errors eliminated by careful proof-reading, would be a useful work of reference, even if not a perfect guide to practice.

C. B. N.

ART. XXXI.—*Surgery of the Urinary Organs.* By SIR HENRY THOMPSON, F.R.C.S., M.B. Lond., Professor of Surgery and Pathology to the Royal College of Surgeons. 8vo., pp. 147. Philadelphia: P. Blakiston, Son & Co.

THIS book consists of six lectures given at the Royal College of Surgeons last June. Parts of them have been printed in various journals, but they now appear entire for the first time. Lectures II. and III. deal with the subject of physical exploration of the bladder and the removal of tumors therefrom, but their substance received full notice in the preceding issue of the AMERICAN JOURNAL OF THE MEDICAL SCIENCES. We shall, therefore, confine ourselves to the topics treated in the other lectures, though they deal with matters more generally known to the profession at large. Whatever Sir Henry Thompson writes on the surgery of the urinary organs is sure to be worth reading, and it is entitled to most careful consideration. For, as he himself states, his experience has been exceptional both in character and extent, while the use he has made of it, and the years of study he has bestowed upon it, have resulted in making him the highest living authority upon these topics.

Lecture I. treats of strictures of the urethra, containing a review of the treatment by dilatation alone, and a statement of his own views as to the expediency of internal urethrotomy. This operation Sir Henry Thompson has practised with increasing confidence since 1855. At first it was only in the worst forms of stricture, those that were very dense and very resistant, that he resorted to internal division, and in many *recent* cases he yet adheres to simple dilatation, but his experience with internal urethrotomy has been so favorable that he has been practising it with continually greater freedom. Altogether, Sir Henry Thompson has done the operation on between three and four hundred patients with very satisfactory results. Less than three per cent. have died. Three succumbed to pyæmia, one to embolism, and two to extravasation and exhaustion. While the lecturer recommends a freer use of internal urethrotomy than formerly,

it must not be thought that he advises a resort to it in every case. In those where the history is recent he thinks that dilatation with elastic bougies is all that is necessary, and by their occasional use comfort may be enjoyed for many years, though with advancing life, and the general hardening of tissues which accompanies that advance, the stricture may be expected to become more troublesome. When, however, a stricture shows a tendency to contract, either early in its history, or after years of successful stretching by bougies, Sir Henry thinks it wise to recommend an immediate urethrotomy. By making the urethra freely patent, he thinks that very many of those conditions which are produced by the obstruction, and complicate its treatment most seriously, may be prevented. To delay division of a stricture which shows a disposition to contract, or which is intolerant of bougies, can do no good, and is the fruitful source of perineal abscesses, cystitis, and various organic changes in bladder, ureters, and kidneys.

To do an internal urethrotomy properly and accurately, the location of each stricture should be ascertained by the use of bulbous bougies. Then, with the author's own instrument, after passing all the strictures, the knife concealed in its bulb is projected to the extent desired, and each stricture divided according to its extent and the amount of surrounding dense tissue. The bulb of the urethrotome is shaped precisely like the bulbs on the sounds by which the strictures have been located, but it cannot be made of the requisite strength with a diameter of less than No. 5. When, therefore, an instrument of that size cannot pass the stricture, an elastic catheter that will pass is tied in, and when sufficient dilatation has been obtained in this way, the urethrotome is used. For this purpose Sir Henry Thompson uses a small-sized catheter, as causing little irritation, and allows it to remain from two to four days. The bulb of the urethrotome should be introduced half to three-quarters of an inch beyond the termination of the stricture, the blade projected towards the floor of the urethra, and the dense resisting tissue divided somewhat as it is done in tenotomy. Immediately after division a full-sized sound is passed, and if any obstacle is encountered, the urethrotome is again made use of, and then a gum catheter is tied in for at least twenty-four hours.

As will be seen it is permeable strictures that our author thus divides, his experience having shown him that while any stricture may be dilated to almost any calibre, by tying in a succession of flexible gum catheters, it is the tendency to narrow rapidly after any dilatation which determines him to advise a urethrotomy. Like Mr. Syme, Sir Henry Thompson does not believe in impermeable strictures, stating that he has only met with three that he could not pass, but he in general rejects Mr. Syme's operation, for the reason that a perineal section only divides one stricture and does not remedy the other ones which so generally exist, resorting to the buttonhole proceeding only very rarely, when perineal fistulæ and abscesses complicate the case. Sir Henry Thompson insists that all the resisting tissue should be divided, or, as he sententiously formulates it, "if you cut at all, cut all." In a few cases the relief is permanent, but in the great majority there is an ultimate return, which will require a repetition of the operation. In three cases Sir Henry Thompson has done the operation for the third time, and he concludes that a free internal urethrotomy is the safest and quickest method of treatment, when the easy use of the bougie fails to bring comfort, and that it is the best means for insuring the future sound condition of the more deeply seated organs.

We pass over the next two lectures for the reasons noted at the beginning of this review, and direct attention to Lecture IV., which deals with the various forms and consequences of impaired vesical function. This condition, the lecturer thinks, is not sufficiently attended to by the profession, while his experience as a consultant leads him to regard it as a most fruitful cause of many troubles. The inability of the bladder to completely empty itself is by no means rare, and the existence of this condition is never an insignificant matter, but always productive of evil, and Sir Henry Thompson urges upon the profession the prime importance of recognizing this fact. He then treats in some detail of that abnormal growth of the prostate which occurs in persons over fifty, but which his experience convinces him is of greater rarity than is stated by some writers. Even when examination per rectum fails to reveal the existence of an enlarged prostate, experience, taken in connection with post-mortem examination, has abundantly proven that a quite small growth between the two lobes may very completely occlude the exit of the bladder, and lead to retention of its contents. But, unless the affection is recent, Sir Henry Thompson is entirely opposed to the internal cutting operations which have been proposed, because the bladder will often be found to have lost the power to expel its contents. Where the affection is recent and the bladder has not lost power, he thinks that his own method of reaching the bladder, by a limited perineal incision, and attacking the growth through that incision, offers the best prospects for a successful issue. But he has not practised the proceeding. After a few remarks upon the gravity of true paralysis of the bladder, our author goes on to treat of the conditions which have been generally known as atony. First among these conditions he treats of chronic inflammation of the coats of the bladder, induced by repeated attacks of cystitis, resulting in hypertrophy of the walls, the patient being subject both to an inability to distend the bladder and inability to completely empty it. Then we have irritation of the neck of the bladder and congestion of the prostate, not hypertrophy, induced by repeated attacks of gonorrhoea and irregular living, incautious mechanical treatment, calculus, or retained fragments of one. Although the amount of urine retained in these cases may be very small, the lecturer deems it of the utmost importance that the organ should be thoroughly emptied by the use of the soft catheter at regular intervals, if we would avoid permanent injury. Sir Henry then goes on to point out the importance of careful, gentle catheterism by soft instruments, and with many details upon which we cannot dwell here. He points out the aversion which many persons have to the use of instruments, which aversion is shared by many members of the profession, an aversion born of the rough and heroic treatment too often adopted in former times, and which he hopes may gradually disappear under the prevalence of the gentler, and, therefore, better methods which have been advocated of late years. This lecture is full of interest and is a forcible appeal for the proper use of proper instruments, as the essential treatment necessary for the relief of very many bladder symptoms.

Lecture V. is devoted to a consideration of the progress of operative surgery for the relief of stone during the present century, and a notice of the most recent improvements in lithotripsy. A brief, but most interesting historical account introduces the subject, not the least attractive portion of which is that in which the lecturer tells of his relations with M. Civiale, to whom he acknowledges his obligation, and whose pupil he styles himself. The gradual progress of lithotripsy is detailed and the contributions

to its perfection as an operative procedure are noted. In 1878, the method of removing all calculi at one sitting was devised and proposed by our own countryman, Dr. Bigelow, and has been adopted by Sir Henry Thompson, who now speaks of it upon the basis of an experience with some two hundred cases. While adopting Dr. Bigelow's procedure, our author has modified some of its details. He is particular to point out that from the days of Heurteloup the aim of surgeons has been to get rid of the whole stone at once, but he very fairly admits the great advance which has been made by Dr. Bigelow's plan and his advocacy of it, though unwilling to adopt the name "Litholapaxy" proposed by Professor Bigelow. Sir Henry Thompson insists that, ordinarily, larger instruments than will easily traverse the urethra should not be resorted to. No. 15, English scale, he has found amply sufficient in the vast majority of cases, as when that size is readily admitted to the bladder it is quite easy and safe to pass one a size or even two sizes larger should it be required. Professor Thompson uses lithotrites of the ordinary form. The only modifications of the evacuator he mentions are a tap with funnel-shaped opening to the upper half of the India-rubber ball, by which it can be readily filled, or air accidentally introduced removed, and a wire valve by which fragments which have once entered the receiver are prevented from re-entering the bladder. After the operation Sir Henry Thompson keeps his patients in bed, watching against the retention of urine, but otherwise avoiding the use of catheters. He recommends a weak solution of nitrate of silver, half a grain to four ounces of water, as most efficient in subduing chronic cystitis. Within a period of a little more than five years he has operated upon 211 male adults for stone, but in only 15 of these, has he resorted to lithotomy. These 15 were of course the most unpromising cases, and no less than 7 deaths occurred among them. In the remaining 196 cases lithotripsy was resorted to, and in all but two the stone was removed at one sitting. In one case, from fear of the long administration of an anæsthetic, five sittings were resorted to, and in one, where the calculus was of oxalate of lime, and large, four sittings were had.

The mortality in the whole series of 211 cases was 17, or 8 per cent.; for the 196 cases of lithotripsy 10 deaths, or 5 per cent. In the latter part of the time during which these cases presented themselves lithotomy was less frequently resorted to, but four instances of that operation occurring in the last 125.

The lecturer mentions that he has removed at a single sitting lasting seventy minutes, a uric acid calculus weighing $2\frac{3}{4}$ ounces, the patient being seventy years of age, and making a good recovery. The conclusion of Sir Henry Thompson is that lithotripsy at a single sitting bids fair to supersede lithotomy for the adult calculous patient in all cases except those in which the stone is of rare and exceptional size.

Lecture VI. and last is perhaps the most valuable in the series. It consists of an analysis of the results obtained by English surgeons in treating cases of stone, in the past, when lithotomy was nearly the only resource, and now, when it has been in so large measure superseded by lithotripsy. The lecturer points out that whereas in the past a patient rarely underwent more than one operation for stone, being deterred by the pain and risks of the operation from submitting to it save in the last extremity, now it is quite common for one to have stones crushed again and again, as, both the dread and risk of the proceeding having been reduced to a minimum, it is desirable that any concretion, however small, should be

at once removed from the bladder, instead of waiting until the distress can be no longer borne. As a consequence of this change it is pointed out that hereafter an operation can no longer be looked upon as almost invariably the equivalent of one case, for it may quite frequently be merely one incident, and even an unimportant one in the history of the case. Now, as a calculus can be removed by lithotrity with comparatively little risk, and that risk diminishes with the size of the stone, an operation is recommended and submitted to at the earliest possible day. Consequently a calculous patient may have concretions repeatedly crushed, instead of waiting, as was formerly the case, for the development of one of large size, and its removal by lithotomy. Hence Sir Henry Thompson says—

“that a computation of the results of lithotrity is not possible by the numerical record of cases only, and by the bare exhibition of a list of so-called ‘cures,’ and deaths; but that the entire record of the calculous patient’s history—its commencement, the number of operations, the quantities of *débris* removed, and the incidents of the subsequent history, so far as they can be obtained—are essential in order to furnish evidence in regard of the treatment employed, and to render the case useful as a contribution to surgical experience.”

As an aid to greater accuracy in recording cases Professor Thompson regards all first operations, whether the stone is large or small, as an “operation for the stone,” but styles those deposits which form frequently afterwards, and which are crushed when small, “concretions,” and does not include their removal in his list of operations. To formulate a rule in these cases is difficult, but the lecturer suggests that when after the removal of the primary “stone” it becomes necessary again to empty the bladder, all formations of less than a drachm in weight should be recorded as “concretions” rather than as “stones.” His own cases occurring within the past twenty-five years consisting of 812 operations upon 716 individuals have been classified according to this plan.

The lecturer then institutes a comparison between 704 cases collected by Crosse in the period when the knife always was resorted to; 304 cases of Keith and 271 of Sir W. Fergusson, in the era when the practice was divided between lithotomy and lithotrity, and 812 of his own cases, during the time since lithotrity has become the rule. Of Crosse’s 704 cases, occurring at the Norfolk and Norwich Hospitals 35 were females, with 2 deaths; 343 were males below 20 years, with 27 deaths, or 8 per cent., and 326 were males above 20 years with 64 deaths or 20 per cent. Of the whole number 75 males were over sixty years of age, among whom the deaths were 22, or 30 per cent. About the same averages obtain in a series of 1827 lithotomies collected by Sir Henry Thompson in 1860.

Of 304 cases occurring in the practice of Dr. Keith of Aberdeen between the years 1835 and 1868, or the period termed by the lecturer transitional, 4 were females and 23 children. In the remaining 277 adult males lithotomy was done on 161, with a mortality of 38, or 24 per cent.; lithotrity upon 116, with a mortality of 7, or 6 per cent. The mortality in the total number of adults was 45 deaths, or 15 per cent. In 1865 Sir William Fergusson reported to the College of Surgeons his experience with 271 cases. Of these, 52 were lithotomies in children, with a mortality of 2, or 4 per cent.; 110 were lithotomies in adults, followed by 33 deaths, or 30 per cent.; and 109 were lithotrities, with 12 deaths, a mortality of 11 per cent. The total mortality in the adult cases was 20 per cent.

Next follows an analysis of the lecturer's own statistics, marvellous in their proportions and most admirable in their results. He tells us that prior to 1860 he was of the opinion that lithotripsy should be more generally employed, and as a consequence his lithotomies became less frequent with each year, being gradually restricted to cases of large calculi. In 1878 he began to employ lithotripsy at a single sitting (Bigelow's method) and with growing confidence in its efficiency, with the consequence that, while he has done 196 lithotrities, he has only resorted to lithotomy 15 times. In the last 125 cases only four have been cut, while 121 were cases of lithotripsy at a single sitting, a proportion of 30 by crushing to 1 of cutting. In the 211 cases the mean age of the entire number was upwards of sixty years. Altogether Sir Henry at the time this lecture was delivered had performed 812 operations on 716 individuals. Of these, 13 were adult females; 10 being operations by lithotomy, with one death, and 3 by lithotripsy: 15 were children; 12 being operated on by lithotomy, with one death, and 3 by lithotripsy. Two were operations for the removal of foreign bodies, one of which was supra-pubic. 782 were adult male cases, of which 110, or one-seventh, were operated on by lithotomy, with 39 deaths, or 35 per cent.; 672 were operated on by lithotripsy, with 43 deaths, or a mortality of less than $6\frac{1}{2}$ per cent. The total mortality in the 782 male adult cases was 82, or $10\frac{1}{2}$ per cent. Attention is called to the fact that among the adult males 595 individuals were upwards of fifty years of age at the time of operation. Of the 716 individuals, 61 were operated on twice, nine were operated on a third time, three a fourth time, and two as often as five times. The two who were the subjects of operation five times were both living in comfort at the time of the lecture, their histories reaching over from twelve to fifteen years. Certainly the position of lithotripsy would seem to be established by these figures, and we can hardly wonder that our author prints them in small capitals.

Referring to the fact that the reputation of an operator is likely to attract to him many desperate cases, Sir Henry Thompson tells us that he has declined to operate in but six such cases. His last 125 cases furnish the remarkably low mortality of less than 5 per cent. In addition to the specimens exhibited, the lecturer claims to have substantiated his statistics by the clinical notes of each case, the name of the patient, together with that of the attending medical man with whom the case was seen in consultation, and with quite pardonable pride he speaks of it as the "faithful record of one man's practice during five-and-twenty years, as complete and as elaborately reported as it has been possible to make it."

The experience of Sir Henry Thompson has confirmed the opinion he long since expressed that stone is more prevalent during the latter third of life than at any other period, and he believes that the presence of a small acid stone is more common in patients between fifty-five and seventy-five years of age than it was formerly believed to be. He thinks that many men carry a small stone in the bladder for three or four years with little inconvenience, beyond slightly increased frequency of micturition, occasional uneasiness, and a trace of blood after unusual exercise. These slight signs he considers as highly significant, and holds that by paying attention to them, he has often been led to detect a calculus, and remove it, at a time when the operation required was much less serious than the one which would be necessary if the stone was allowed to go on and develop into a calculus of larger size. The early detection of a stone

is also of the highest importance, by enabling the surgeon to pay that attention to the habits and regimen of his patient which will help to arrest the tendency to such formations.

In concluding the lecture the question of the method of operation which shall be resorted to in a given case is considered. This must be principally decided by the size of the stone and the calibre of the natural passage to the bladder. For children, lithotomy still offers the best prospect of success, but in adults, lithotrity should almost always have the preference. Our author has successfully crushed a hard uric acid calculus weighing nearly three ounces in a man of seventy, and this would seem to be a fair maximum limit in which lithotrity can be relied on. For larger stones Sir Henry Thompson is disposed, from the unsatisfactory results of lithotomy in these cases, to look favorably upon the supra-pubic operation as modified by Professor Petersen, of Kiel, who distends the bladder with a solution of boracic acid, and then distends the rectum by a pear-shaped India-rubber bag inserted into it. By this measure the bladder is maintained above the pubis, and can be safely reached. This method has been resorted to by Petersen, by Guyon and Perrier of Paris, and by Dittel of Vienna. But while our author announces his intention of resorting to this method should a case present itself, and in fact did perform the operation and remove a calculus of cystine weighing nearly three ounces, a week after this lecture was delivered, he thinks that the crushing operation is abundantly competent to deal with many such cases as are now made the subject of the high operation.

We have now followed our author in some detail to the conclusion of these lectures. This we have felt warranted in doing from the importance of the subjects with which they treat, from the high authority of the lecturer, an authority based not only upon ability, but upon his unparalleled experience, and from the admirably clear and forcible way in which Sir Henry Thompson presents his theme. The book well sustains the reputation of its author, and should be read and studied by every one who desires sound instruction upon the subject of the surgery of the Urinary Organs.

S. A.

ART. XXXII.—*The Ophthalmoscope and Lues.* By OLE B. BULL, M.D., 8vo. pp. 117. Christiana: P. T. Malling, 1884.

THE object of this work is the discussion of the pathological changes resulting from syphilis which occur in the fundus of the eye, and are revealed by the ophthalmoscope.

The first chapter consists of some interesting and quite elaborate "historical notes" which show that the frequent dependence of affections of the sight upon syphilis was recognized very early in the history of the disease, and "that syphilitic eye diseases made their appearance in the 15th and 16th centuries in much the same manner as now, affecting both the membranes of the globe and the percipient organs of the eye." In the latter part of the 18th century the knowledge of these diseases was as correct as it could possibly become without the ophthalmoscope, even the hereditary form being recognized. The ophthalmoscope has shown that many affections formerly attributed to the optic nerve and brain are dependent upon lesions of the choroid and retina.

The author maintains that more frequent ophthalmoscopic examinations would show that it is a mistake to suppose that syphilitic affections of the fundus oculi are more rare than those of the iris, as they are often accompanied by little or no functional disturbance. This is particularly the case with hyperæmia of the optic disk, which, in a majority of cases, causes no decided diminution of vision, and even in the highest degree ("choked disk") it is well known that the patient may make no complaint of his sight.

He thinks that this symptom, which frequently appears at an early period of the disease, may sometimes be significant as a means of diagnosis, and says:—

"The period of the disease at which hyperæmia most frequently occurs is the later secondary. I have never found it unless complicated with cerebral disease, later than two years after the infection. As a rule, it appears at that period when roseola, tubercula mucosa, and the affections of the mucous membrane of the throat and mouth begin to disappear. In some individual cases I have found incipient hyperæmia to be the first symptom of the constitutional disease. Its appearance just at that period when the patient is usually discharged may probably account for the frequency of this fact having hitherto eluded notice, and this reason may especially apply to countries where, in the treatment of syphilis, mercury is considered indispensable, such being the case in most countries except Norway, and where, consequently, the secondary symptoms will be of shorter duration."

It is well known that "hyperæmia of the optic disk" is one of the most indefinite and unreliable of symptoms, and that a decided "personal equation" must be allowed for the judgment and bias of the observer. The appearance of the disk not only varies greatly with the pigmentation and the general vascular activity of different individuals, but even in the same person there is a wide range of variation within the limits of health. Perhaps some poetic license must be conceded to a recent writer who asserts that the color of the optic disk varies almost as much as the changing hue of a maiden's cheek, but the fact remains that this symptom is regarded with most suspicion by those who have had most experience in the use of the ophthalmoscope. The author has not ignored this fact, and "in order to obtain a tolerably accurate estimate" has divided his cases into three classes: 1st. Those in which no hyperæmia was visible; 2d. Those which were doubtful; and 3d. Those in which hyperæmia was undoubtedly present. Of four hundred syphilitic patients who were frequently examined, and whose cases were accurately noted, he found "indisputable hyperæmia" in 20 per cent. Cases of retinitis and decided neuritis are not included, but the term hyperæmia is applied to those "extreme degrees" usually designated as choked disk, peripapillar œdema, etc.; and here we find ourselves upon disputed territory.

Concerning the primary cause of hyperæmia, the author concludes "that the limitation of the affection to the optic nerves and the surrounding parts of the retina points to the presence of some intracranial cause." He briefly discusses the three principal theories that have been advanced to explain the connection between this condition of the optic nerve and intracranial disease, viz. obstruction to the venous circulation by compression of the cavernous sinus; accumulation of cerebro-spinal fluid in the perineural spaces; and disturbance of the circulation due to the influence of the vaso-motor nerves; and gives the preference to the last.

In a large proportion of the cases other symptoms indicating an affection of the nervous system, such as headache, dizziness, etc., were noted.

In the chapter on "*affections of the optic nerve in the later stages of syphilis*," while it is admitted that it may sometimes be impossible, by the ophthalmoscope alone, to distinguish between a real inflammation and a passive hyperæmia, the so-called "choked disk" is still considered to be a condition of passive hyperæmia, differing from slighter cases only in degree. It has a place, however, in this chapter because it is usually a symptom of some intracranial disease of a later period and a graver character, generally a cerebral tumor.

The author thinks that too free a use is generally made of the term neuritis, and that "many, if not most, of the cases recorded as neuritis syphilitica ought to be considered as cases of hyperæmia of the optic disk only;" and that relatively few cases of real neuritis are reported is due to the fact that it belongs to a late period of the disease, when all signs of infection have disappeared, and its specific character escapes detection. Its appearance within two years after infection is considered rare.

Atrophy of the optic nerve, both of a primary and of a secondary form, is said to occur as a result of syphilis. The latter form follows retino-choroiditis, neuritis, or hyperæmia of the disk, and is not generally considered very rare. In establishing the existence of a syphilitic primary atrophy we meet not only with the difficulty of connecting the condition of the nerve with a specific cause, but with the usually greater difficulty of determining that it is not the sequela of previous inflammatory disease. This latter can only be done with certainty by observing the patient from the very commencement of the attack, the opportunity to do which but rarely occurs. On this account, one of the four cases reported by the author seems to us of special interest, as the patient was under his observation for three years, and the development of the atrophy was carefully watched from the beginning. Ophthalmoscopical examinations were frequently made before there was any complaint of vision, and the eyes were found normal. Subsequently ophthalmoplegia and paralysis of the facial and of the arm and leg appeared, and were soon followed by amaurosis of the right eye and hemianopia of the left. The ophthalmoscope at this time showed only some diminution of the arteries, and atrophy of the disk was noted later. A post-mortem examination revealed "atrophy of the corpus striatum, nucleus lentiformis, and the anterior part of thalamus up to fossa Sylvii on the left side."

More than half of the work is included in the last chapter on "*affections of the choroid and retina*." The author maintains that retinitis and choroiditis should not be considered as distinct diseases, but that they are dependent on the same pathological process, which originates as a rule in the retina. Its origin in the retina he attempts to prove by an elaborate discussion of *scotomata*, *phosphènes*, and other symptoms; but we are not sure that he succeeds in establishing his view, which is opposed to the one more generally accepted. Whether the retina or the choroid is first affected seems to him a question more important than it is usually considered. "Is the disease of retinal origin? then this proves to us that the nervous system is often severely affected in an early period of syphilis; and the occasional complication of mental diseases with retino-choroiditis would then be much better apprehended." He admits that no form of the disease is so distinctive that the diagnosis of syphilis can be established from the eye affection alone.

This pamphlet is evidently the result of much careful, intelligent, and honest work, and is a valuable addition to ophthalmological literature.

G. C. H.

ART. XXXIII.—*A Practical Treatise on Fractures and Dislocations.*

By FRANK HASTINGS HAMILTON, M.D., LL.D., late Professor of Surgery in Bellevue Hospital Medical College, New York. 8vo., pp. xxxi., 1005. Seventh American edition. Henry C. Lea's Son & Co., 1884.

By continued careful revisions and additions, the work of Dr. Hamilton still maintains its high place among authoritative treatises. In the present edition there is abundant evidence of the conscientious care taken by its author to make it fairly representative of the present state of our knowledge concerning fractures and dislocations. Recent contributions to the subject have been scrupulously examined, critically, and with much fairness. As a consequence, the opinions expressed in former editions have in some cases undergone modification, and it is impossible to avoid the conviction produced by an inspection of the volume, that we have in it the matured judgment of one who by extended personal observation, and by honest consideration of the experience of others, is well entitled to occupy a judicial position.

Dr. Hamilton apologizes in his preface for the rather low estimate he places upon some recent experiments upon the cadaver, undertaken with a view of explaining the rationale of dislocations and fractures in the neighborhood of the joints. He points out the fact that the absence of muscular rigidity, which always exercises a most important influence in the production of such injuries in the living, must do much to invalidate experiments upon the dead. We hardly think the apology is required, as most practical surgeons who are observant will be quite ready to agree with Professor Hamilton, that while most of these experiments furnish valuable information that it would be unwise to reject, the results thus obtained cannot be accepted as illustrating precisely what occurs in traumas inflicted upon the living body. There is another curious fact which has a bearing upon this subject, and which goes to strengthen the position of Dr. Hamilton; we refer to the truth established by Casper and other observers, that much greater force is required to fracture the bones of a dead body than is necessary when the body is living. This fact is not so generally recognized as it should be, while it has an important bearing upon the subject in hand, and is of especial importance in some medico-legal investigations.

In view of the monograph published by Dr. Hamilton three years ago, the chapter upon Fractures of the Patella will be read with especial interest. It is based upon the same statistical inquiries as the monograph, and is both full and exact. Dr. Hamilton is convinced that the fibrous union which so generally follows this accident is a very good result if the ligamentous band is not excessive in length. He, therefore, does not look with favor upon some of the severe forms of apparatus which have been devised with the hope of securing bony union. Nor does he admit that bony union is more apt to follow the use of hooks and other special forms of dressing, than is the case where his own, or some other simple appliance, is relied upon. We are emphatically of the opinion that Dr. Hamilton is right, and that the effort to revive the use of Malgaigne's hooks, while fraught with a certain percentage of great danger, is uncalled for by the necessities of the injury. Dr. Hamilton applies a moulded splint of shellac cloth to the back of the limb, and secures the fragments of the patella in apposition by circular turns of a bandage, without reverses.

The effect of slipping is overcome by stitching the turns of the bandage immediately in contact with the patella to the splint. Dr. Hamilton also elevates the foot. By this simple dressing it is claimed that most admirable results are obtained, and our author no longer advocates the inclined plane recommended in former editions, unless in exceptional cases. Particular attention is directed to the importance of guarding against refracture, and the position is held that we had better leave anchylosis to time and gentle methods, rather than resort to violence to break up adhesions.

It is unnecessary to speak in detail of the characteristics and excellences of a book so well and favorably known to the profession as this one is. It has grown in size, and the number of its illustrations is increased, but with advancing years it is no less an authority than it has ever been. There remains nothing for us to say but to reiterate that opinion of the value of Dr. Hamilton's great and monumental work which we have so often expressed. To the critic belongs a grateful task when such a work finds its way to his table, and pleasant as are the relations between the author and the reader of a good book, they are rendered closer when the reader ventures upon friendly words of criticism. New editions of Dr. Hamilton's work will be called for, and so long as the same painstaking care is exercised in their preparation, the book is destined to maintain the position it has richly earned.

S. A.

ART. XXXIV.—*Injuries and Diseases of the Jaws*: the Jacksonian Prize Essay of the Royal College of Surgeons of England, 1867. By CHRISTOPHER HEATH F.R.C.S., Holme Professor of Clinical Surgery in University College, London, etc. Third edition. 8vo. pp. xii., 480. Philadelphia: P. Blakiston, Son & Co., 1884.

THIS book is one which calls for notice rather than criticism. Coming from whom it does, one would hardly expect it to be open to objection, and the author having had the benefit of nearly twenty years' experience to complete its merits, since first it secured the approval of the awarders of the prize mentioned in the title, it would be strange if it should disappoint any reader. It is, we may say, just what it might be expected to be under the circumstances: a most valuable essay on the subject of surgical diseases and injuries of the jaws and adjacent parts. It is not a text-book, but a book for the practising surgeon, filled with interesting accounts of cases and instructive details. Its value is much enhanced by the many illustrations which it contains. Some of these are from the works of other surgeons, some are original. It is noticeable, in this day of microscopical studies, that there is not a single illustration of the minute structure of any of the tumors referred to. This, from our point of view, is no great disadvantage, and suggests the thought that training in the minutiae of microscopical technique may be a poor substitute for the habits of careful observation and reflection upon gross appearances which were used with such admirable results by our forefathers. Laboratory work is of the greatest value to the science of medicine, but its usefulness depends upon its occupying its true place as a handmaid, and not being thrust into that of an independent actor.

C. W. D.

ART. XXXV.—*Medical Diagnosis, a Manual of Clinical Methods.* By J. GRAHAM BROWN, M.D., Fellow of the Royal College of Physicians, Edinburgh. Second edition, illustrated, pp. 285. New York and London: Birmingham & Company, 1884.

DR. BROWN'S Manual deserved a better fate. The contrast is painful between this dingy, badly printed volume, and the bright, clean, red-covered Edinboro' edition, and yet the price of the American reprint is much the same, if not a little higher. If the publishers give the author the doubtful pleasure of seeing his work in this dress, we would suggest that a soothing *douceur* accompany it. We happen to know that the English editor of Ziegler's *Pathology* only recovered from the shock which the meretricious aspect of Messrs. Wood & Co.'s edition gave him, upon the receipt of a compensating honorarium.

From a practical knowledge of it, we can commend this work to teachers and students as a most trustworthy manual of clinical methods. W. O.

ART. XXXVI.—*Elements of Surgical Diagnosis.* By A. PEARCE GOULD, F.R.C.S. Eng.; Assistant Surgeon to the Middlesex Hospital, London; Surgeon to the London Temperance Hospital, and to the Royal Hospital for Diseases of the Chest. 24mo., pp. viii. 584. Philadelphia: Henry C. Lea's Son & Co., 1884.

THIS convenient and handy volume is constructed according to sound rules, and would seem suited to satisfy the demands of those who value works especially devoted to diagnosis. Mr. Gould very properly insists upon the importance of looking beyond any mere pathognomonic signs to the principles of surgery underlying and causing such signs. He is particular in laying down categorically the mental process by which each individual case should be approached when there is any obscurity in it. It is impossible to overestimate the importance of such a regular and orderly way of proceeding, and as Mr. Gould points out, when such a method is pursued, and is combined with a careful and minute observation of the individual, the risk of serious blunder is very small. So convinced is he of the essential importance of viewing each case by itself, that he has discarded the plan of printing parallel columns containing the symptoms of affections which may readily be mistaken for each other. We recognize the weight of Mr. Gould's reasons, and admit their importance in constructing a systematic treatise intended to aid men in becoming accurate diagnosticians, yet we are inclined to think he errs in excluding such tables, on account of their convenience, and the facility with which they can be referred to. For while students and some older men may read a work upon diagnosis through, the majority of practitioners will turn to it for aid in solving an obscure problem, and in such a case the presence of comparative tables is very convenient. That our meaning may be better understood we will cite an instance. We happen to have under our care a child with osseous disease, which one competent authority pronounces to be

owing to inherited syphilis, and another, equally good, regards as the result of struma. In the absence of other than a presumable family history the diagnosis is not easy, and we naturally turned over the pages of this little book to enlighten our darkness, and should have been glad to find differential tables of symptoms to help us to a conclusion, but we have had to go over much ground, instead of finding comparisons displayed on a single page.

We have said this much, not by way of unfavorable criticism concerning this excellent book, but as indicating the difficulties which must be inseparable from any work upon surgical diagnosis. Mr. Gould has met these difficulties of his task well, and he has produced a good book. It is of a convenient size, and we shall be much mistaken if it does not become popular. Mr. Gould's style is good, and he is endowed with that rare grace, modesty, so that it is with pleasure we add that he is to be congratulated upon having produced a valuable contribution to surgical literature.

S. A.

ART. XXXVII.—*The Year Book of Treatment for 1884.* 8vo., pp. 308. Philadelphia: Lea Brothers & Co., 1885.

"The object of this book is to present to the practitioner, not only a complete account of all the more important advances made in the treatment of disease, but to furnish also a review of the same by competent authorities. Each department of practice has been fully and concisely treated, and care has been taken to include such recent pathological and clinical work as bears directly upon treatment."

THE "year" included in this book ends Sept. 30, 1884. After carefully looking over the book, and reading a number of the principal articles, we can endorse the statements set forth in the portions of preface which we have quoted. In a few moments, the busy practitioner can refresh his mind as to the principal advances in treatment for a year past, advances which are regarded as such by J. Lauder Brunton, Charles Henry Ralfe, Dyce Duckworth, J. Mitchell Bruce, R. Douglass Powell, F. A. Mahomed, Arthur E. Sansom, and others in the various departments of medicine; and Bryant, Treves, Haward, Edmund Owen, Reginald Harrison, Alfred Cooper, J. Knowsley Thornton, Champneys, Henry Power, and a number of well-known practical workers in the field of surgery, diseases of women, of the eye, of the ear, of the throat, nose, and skin. The book concludes with a general summary of the therapeutics of the year 1883-1884 by Walter G. Smith, M.D. This kind of work is peculiarly useful at the present time, when current medical literature is teeming with innumerable so-called advances, which the average practitioner has neither time nor experience to determine the value of. Here he has, collected from many sources, a *résumé* of the theories and facts which are new, either entirely or in part, the decision as to their novelty being made by those who by wide reading and long experience are fully competent to render such a verdict.

C. B. N.

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

Case of a Hermaphrodite aged nine years with the external appearances of a Female, in whom both Testicles were removed from the Labia Majora.

Dr. GEORGE BUCHANAN, in the *Lond. Med. Times* of February 14, 1885, reports a case of hermaphroditism in which the testicles were found in the labia majora. Grave doubts were at first had as to the nature of the case, and it was thought that the swelling in the labia might be caused by a double hernia sac, each containing an ovary. This however seemed improbable, and the alternative suggested itself that the child might be a hermaphrodite, externally a female, with testicles in the labia. Nevertheless the external organs were those of a female, and the vagina, nymphæ, clitoris, meatus, and hymen were normal, being exactly as would be expected in a girl nine years of age.

Examination further showed that on touching the skin on the front of the thigh the bodies in the labia were immediately drawn up close to the inguinal ring, thus proving the existence of cremaster muscles, and conclusively showing them to be testicles.

Accordingly the patient was anæsthetized, and the testicles, which were contained in unclosed tuniçæ vaginales, removed at separate operations a few weeks apart.

During the time the patient was under the influence of chloroform a complete examination of the external organs was made, which, as has been said, were perfectly normal. The vagina extended the usual depth, but when the finger reached the extremity, instead of the os uteri there was a vertical septum, on each side of which was a little *cul-de-sac* like a very small thimble. The only other condition dissimilar to the normal female organs was the existence of a narrow slit at each side of the meatus large enough to admit the point of a probe.

Hypnotism.

L'Encéphale for November and December contains an interesting study upon hypnotism, by M. AUGUST VOISIN, of which the following are the conclusions:—

1. Hypnotic slumber has been frequently produced by fixing the attention of the patient upon some organ, as the eyes; or by making pressure near the base

of the nose; or by apposition of the hand to the closed eyelids; or by the effect of the magnesium light upon the eyes, which must be kept open. Sometimes it is necessary to follow for a long time the patient's eyes. These procedures repeated for two or three days render the results more certain.

2. Each hypnotic slumber is preceded by sensations of dizziness, and heaviness of the eyelids, or by nausea.

3. In many cases the initial period is accompanied by shivering and trembling. These are only produced when the slumber has been slow in appearing.

4. The hypnotic slumber is very calm. Anæsthesia and collapse are complete. The patient may sleep from 22 to 23 hours. She moves, turns upon her couch, and speaks, from time to time, when disturbed. Her awakening does not at all resemble that of a person arousing from a natural sleep. Thus, she suddenly sits up, does not stretch or yawn, but arises from her bed as if to leave the room. The countenance shows no sign of fatigue.

5. It is possible to suggest during each slumber divers acts to be performed on awakening, or a number of hours or days thereafter. Thus, it has been suggested to a patient to take at a certain hour a flask of wine concealed for her, or to carry an object to a comrade; also, a patient has been made to greet a sister, to whom heretofore she had shown the greatest animosity, with the greatest manifestations of love and affection.

6. The patient being directed to awake at a given hour, will do so in spite of protestations to the contrary, the time coinciding with the striking of the hours, or a very few minutes after.

7. The effect of hypnotic slumber frequently produced is progressively to allay the excitement of the patient, and notably to diminish disorders of action and speech.

8. The contrast which exists between incoherence of action and speech during waking hours and their reasonable character during the slumber is worthy of special remark.

9. In a particular patient it was remarkable that during the persistence of the slumber she lamented, without suggestion of Voisin, her questionable manner of life, etc.; but awake, she spoke only of rejoining her companions, of enjoying herself, and of revelling.

10. The question suggests itself whether it is not possible, by means of hypnotic slumber, in a certain variety of cases, to quiet excitement, and give to the mind a moral and intellectual inclination.

Pathological Physiology of the Supra-Renal Capsule.

In a recent number of the *Rivista internaz. di Medicina e Chirurgia*, TISSONI, of Bologna, reports a series of experiments made by him, chiefly with the idea of clearing up the pathology of Addison's disease.

He propounds the following questions: 1. What are the relations of the supra-renal capsule to the cerebro-spinal nervous system and to the great sympathetic? 2. What is the reaction of the capsules to excitants? 3. By what process do destruction and absorption of the constituent elements of the parenchyma of these organs take place, after a stimulation so great as to profoundly alter their vitality? 4. Is partial or total reproduction possible after partial or total destruction, and by what process does the new formation take place? 5. Is hypertrophy of one capsule possible after destruction of the other? If so, what parts of the capsule are especially interested in that process, and what are the histological facts in the case? 6. What are the general modifications of the organ-

ism, particularly that related to the pigmentation of the skin and the mucous membranes, which tend directly to the destruction of one or both capsules?

Tissoni operated on 31 rabbits, after having perfected himself in the operative technique. The duration of the experimental watch over each rabbit varied from 21 to 219 days. Of the 31 rabbits, only 5 were killed, the experimenter confining himself to the exposition of the gross, macroscopical phenomena observed in the course of his experiments, and to giving a summary of the microscopical appearances in the few animals killed, or which died in twenty days after being operated on. Of the animals that died in consequence of the operation, Tissoni could find no lesions which might be described as special to the operation—as Brown-Séquard claimed. The majority died of subcutaneous and intramuscular suppuration, which had formed in these situations as a thick bed of pus, a sort of false membrane which invaded a large portion of the dorsal region.

In some of the rabbits there was contracture of one of the limbs, anterior or posterior, which disappeared in a few days in some cases, but which was followed by paralysis and death in others. The post-mortem examination of these animals showed an exudative meningitis, and softening of the spinal cord. With the exception of these few cases, the operation was followed, in the greater number of cases, by no serious consequences. The animals walked about and ate, and seemed perfectly healthy during the whole time of observation. The results of the operations did not seem to be affected by the leaving of the capsule in the peritoneal cavity. On the contrary, in a few cases in which the capsule was left, the rabbits seemed to recover more promptly, nor was the absorption of the capsule, which was complete when the animals were killed, attended by any modification of the temperature, or any other unusual symptoms. "Hence," says Tissoni, "the fact that the capsules could be absorbed without causing toxic phenomena at once disposes of the possibility of their containing a virus, or of Addison's disease being a sort of cachexia, due to altered secretion of the capsule or the product of the retention in the blood of certain principles which, under normal conditions, is taken up by the capsules, and becomes a toxic substance."

The first thing noticeable after the operation was the brown discoloration of the mucous membranes; and soon after this, pigmented spots on the buccal and nasal mucous membrane, which commenced as small points, the color of tobacco, which grew larger, became confluent, then brown, then bronze-colored, and finally all the characteristics of Addison's disease. The spots on the lower lip were sometimes isolated more after they formed a black line which ran around the mouth. The pigmentation of the mouth was very frequent, and very important. Tissoni considers it worthy of remark that the abnormal pigmentation appeared after the removal of one capsule only, as well as after removal of both. But in the first case the pigmented spots were found almost exclusively on the operated side, though in some instances they crossed to the other side.

It seems evident, therefore, or experimentally proved: 1. That the suprarenal capsules take part in the distribution of pigment. 2. That the variations in the color of the skin and mucous membranes may occur after the destruction of one or both capsules. 3. That, with the exception of this abnormal distribution of pigment, the animals (rabbits), from which one or both capsules have been removed, remain perfectly healthy, and may live a long time. The alteration in the distribution of the pigment is then the only thing obtained by removing the capsules; the clinical phenomena of Addison's disease were not produced. Regeneration of the capsule was observed in two cases. When only one capsule was removed, there was a subsequent hypertrophy of the cortical substance of the other, rather than of the medullary substance.—*L'Union Méd.*, November 6, 1884.

The Influence of Nervous and Muscular Work, and of Fatigue upon the Tendon Reflexes and Electro-Excitability of the Muscles in Man.

DR. J. ORSCHANSKY, after a long series of experiments, relative to the influence of nervous and muscular work, and fatigue upon the tendon reflexes, and electro-excitability of the muscles, arrives at the following conclusion:—

1. Galvanic and Faradic contractility is augmented at the beginning of labor, but afterwards as the muscles become more and more fatigued it diminishes.
2. In the reaction of degeneration there is often observed a notable diminution of Faradic contractility, with normal conservation of galvanic contractility.
3. Muscular contraction becomes feebler the longer work is continued.
4. These phenomena are noticeable upon all muscles which have undergone either tonic or clonic contraction.
5. Like phenomena are observed in the nerves, but after a much longer time. They therefore are less easily fatigued than the muscles.
6. Muscular excitability returns more quickly when lost than does nervous. A constant current must be used to produce such effect.
7. The tendon reflexes are, in incipient fatigue, exaggerated, but gradually decrease as strength diminishes, and, finally, may altogether disappear. They, however, are more quickly restored than muscular contractility.

The author considers patellar reflex to be muscular, not nervous in its origin.

New Methods for Testing Urine.

In the last session of the Vienna Medical College, Dr. V. JAKSCH called attention to some new methods of examining the urine for various substances. In most cases there exists not only one, but two albuminous substances in the urine, namely, serumalbumin and globulin, and sometimes, also, oxy-hæmoglobin, fibrin, and pepton. Pure globulinuria was observed only in one instance by Kühn. To determine whether the urine contains serumalbumin, pepton, or propeptone, three reactions must be practised. 1. The urine is boiled, and nitric acid is added; if the resulting precipitate contain albumen, after the addition of the acid, it will not disappear, but remain flaky. 2. The next step is to add acetic acid in excess to the filtered urine, and afterwards add solution of potassium ferrocyanide. If albumen be present, excessive cloudiness results. 3. The third test consists of the addition of liquor potassa and sulphate of copper to the urine. The mixture by boiling, becomes of a violet color. If now the first test give negative, and the second positive results, the existence of propeptone is very probably assured. It is positively indicated by the presence of precipitate after the addition of sodium chloride and acetic acid. If the urine contain peptone, both first and second tests will fail, but the third will give positive results. If a small amount of peptone be present, and the urine free from mucin—which is accomplished by the addition of acetic acid—there will result a precipitate upon the addition of acetic acid and phospho-tungstic acid. Albuminuria is of much prognostic importance. In hypertrophy of the heart, without excitation or murmur, if the urine give a precipitate with acetic acid and potassium ferrocyanide, contraction of the kidneys may be diagnosed along with degeneration of the arteries and consecutive red atrophy of the kidneys. The signification of propeptonuria in any disease is not recognized. Through the labors of Schmidt, Mühlhain, and Hofmaier it has been demonstrated that the white blood-corpuscles are peptone carriers. Peptonuria follows ulceration of the colon, ulcerous carcinoma of the stomach, the decay of pus-corpuscles in the body from white blood-corpuscles in the circulation; from scorbutus; in puerperal fever; deep-

seated suppuration; and, finally, in cerebro-spinal meningitis, a point of distinction from tuberculous meningitis. Dr. JAKSCH next mentions liquor potassium as a test for sugar, and the brown coloration which results upon boiling it with urine containing sugar; also, the Trommer's test, and remarks that because these tests are not sufficiently reliable, PENOZLDT'S test should also be used. This consists in the addition of diazobenzene sulphonic and acetic acid to the suspected urine; if sugar be present an intensely red color with marked turbidity results. As an entirely reliable test, JAKSCH also recommends that of von FISCHER with phenylhydracin. Finally, REDNER discussed the methods for the detection of the acetons, which appear in the body during the existence of fevers, inanition, and carcinoma.—*Wien. Med. Wochenschr.*, December 6, 1884.

MATERIA MEDICA AND THERAPEUTICS.

Antipyrin.

HUCHARD, in a therapeutic study of "antipyrin," which appears in *L'Union Médicale*, Dec. 6, 1884, reaches the following conclusions:—

1. Antipyrin is a powerful and certain means of reducing the temperature in almost all febrile diseases (typhoid fever, phthisis pulmonalis, pneumonia, pleurisy, acute articular rheumatism, cerebral rheumatism, erysipelas, diphtheria, puerperal fever, scarlatina, abscess, phlegmon, etc.). It mitigates the symptoms which depend upon the elevation of temperature (acceleration of the pulse, and of respiration, dryness of the mouth), but does not appear to have any direct action upon the respiration and circulation.

2. Antipyrin is an antipyretic and not an antiperiodic, and is, therefore, inefficacious to prevent the recurrence of intermittent fevers.

3. Its administration gives rise sometimes to slight discomfort, such as light sweating, constriction of the pharynx, nausea and vomiting, and, in rare cases, to rubeolous, or scarlatinous exanthsms. There is no tendency to collapse, or intoxication, as after the administration of preparations of quinia, or the salicylates.

4. Numerous observations show that antipyrin is the most powerful and up to this time the only known means of successfully reducing the temperature of tuberculosis. In a dose of 30 grains administered in the evening, at the appearance of the fever, the temperature decreases a half degree in half an hour, sometimes in a quarter of an hour, and then diminishes progressively to normal in an hour and a half or two hours. It is, however, sometimes necessary to prescribe, an hour or two later, a second dose of 15 or 20 grains. But in consumptives, antipyrin, by reason of the surety of its action, and with the aim to escape accidents produced by abnormally low temperature, should be administered in small but increasing doses (30 to 60 grains).

5. The antipyretic effect is maintained ordinarily from six to nine hours, and is felt sometimes during several succeeding days, during which the temperature does not attain its former elevation. The secondary rise of temperature is progressive, following in this respect the progress of defervescence. It is not sudden, as that produced by kairin, and is never accompanied by a chill more or less prolonged.

6. Antipyrin is eliminated by the urine, where its presence is recognized in from two to four hours after its administration, during a period which varies

from thirty-six to forty-eight hours. A few drops of the perchloride of iron mixed with the urine of patients treated with the drug cause at once a red coloration, which is very characteristic.

7. Huchard has not yet employed antipyrin in typhoid fever, but, according to foreign authors, it is necessary to employ doses of from 75 to 91 grains daily (30 grains at the interval of an hour, and 15 or 30 the third hour). Under the influence of these doses the reduction of temperature is, for the first hour, a minimum, 1.8° F., and a maximum of 3.6° , and continues to fall until the seventh or eighth hour. Frequently at the fifteenth or sixteenth hour rises again about 1.8° , and again falls regularly. This mild rise of temperature has been noticed also by us during the action of antipyrin upon the fever of phthisis.

8. In typhoid fever, doses of from 90 to 120 grains, directed by some writers, appear to us too large, since they bring on a temperature abnormally low. In cases recorded by P. Snyers, seven or eight hours after the administration of the drug there was, in nine cases, a temperature below 96.8° ; in ten, below 95° ; in four, below 93.1° ; and in one, below 91.4° .

Employment of Hydrochlorate of Cocaine in Obstetrics.

Dr. ALPHONSE HERRGOTT, after a comparative study of many reports concerning the use of hydrochlorate of cocaine in obstetrics, and after numerous experiments of his own, in which the effects of the drug were carefully noted, reaches the following practical conclusions as to its value:—

1. Sensibility to pain was always very markedly diminished. Only moderate pain was felt, which was almost *nil* in superficial parts and much diminished in the deeper tissues.

2. Cocaine also entirely anæsthetizes an inflamed mucous membrane, as is shown by its effects in vulvitis and acute genorrhœal vaginitis.

3. Reflex vaginal excitation is diminished by application of the drug.

The preceding effects having been noted, the general indications for the use of cocaine may be summarized as follows:—

1. *To produce anæsthesia.*—*a.* Before extensive cauterization of the vulvar or vaginal mucous membrane, or before the application of caustic, or concentrated solutions of corrosive sublimate.

b. Before the removal of small superficial vegetations of the vulvar mucous membrane: for example, in condylomata or caruncles of the urethra.

c. In excitable patients, in cauterization of the uterine neck or previous to the use of the curette in the uterine cavity.

2. *To diminish reflex excitement.*—*a.* In case of temporary vaginismus, before the touch, or introduction of a vaginal speculum, or even by the patient herself before coitus.

b. In case of spasm of the rectum and anus occasioned by fissure, either for operative procedures without general anæsthesia, or for the relief of pain during defecation.—*Annales de Gynécologie et d'Obstétrique*, Feb. 1885.

Cerebral Symptoms from Subcutaneous Injection of Hydrochlorate of Cocaine.

At a recent meeting of the *Société de Thérapeutique*, M. DUJARDIN-BEAUMETZ called attention to an accident which may result from the subcutaneous injection of hydrochlorate of cocaine.

The chief of his laboratory after such injection experienced a feeling of syncope and two similar cases have also been observed by him. Another patient experienced strange sensations, along with cerebral excitement.

The degree of concentration of the solution seemed to have no influence upon its action. Dujardin-Beaumetz attributes the peculiar effects observed, to cerebral anæmia, since they were not noticeable when the patient was reclining when the injection was administered.—*Gazette Hebdomadaire de Méd. et de Chirurg.*, Feb. 6, 1885.

Thallin as an Antipyretic.

Dr. C. ALEXANDER, after carefully observing the effect of thallin in reducing temperature, states the following in reference to its action. In almost all instances, the pulse-rate diminishes in frequency along with the lowering of temperature, after the administration of thallin or its salts.

The pulse-rate is, however, not markedly influenced as the temperature, and almost never is reduced to normal; sometimes it remains unaffected, but no unfavorable cardiac symptoms ever follow the use of the drug.

In the greater number of cases lowering of temperature is accompanied by general perspiration. Seldom indeed was perspiration entirely absent, and was not excessive except only in a single case of phthisis.

The antipyretic effect of the drug is observed also in those cases in which perspiration is absent.

The duration of the abatement of temperature, caused by a single dose of 4 grains of thallin, is short, seldom lasting more than four, and usually but two or three hours. A second dose again reduces the temperature to normal; but in from three to five, and sometimes even in two hours, it once more begins to rise.

When the drug is discontinued, the temperature returns to its former height within two to four hours.—*Centralbl. für Klin. Med.*, Feb. 7, 1885.

Therapeutics and Action of Euphorbia Pilulifera.

MARSET summarizes the action and therapeutics of *Euphorbia pilulifera* as follows:—

1. The active principle of *Euphorbia pilulifera* is soluble in water and dilute alcohol, insoluble, or nearly so in ether, chloroform, sulphide of carbon and oil of turpentine.

2. It is toxic in weak doses to the small animals, which it kills by arresting respiration and stopping the pulsations of the heart, which are at first accelerating, but gradually cease under its influence.

3. Its effects are not cumulative.

4. It appears to act directly upon the cardiac and respiratory centres, to which its influence is limited.

5. It appears to be eliminated by the liver.

6. Locally, it is without action upon the skin and mucous membranes, except upon the gastric mucous membrane, which it irritates.

7. It gives good results in attacks of dyspnoea caused by asthma, emphysema, or chronic bronchitis in abundant watery solution, taken preferably immediately before meals.

The aqueous or alcoholic extract is a good preparation. A grain daily is the maximum dose employed, and frequently five-sixths of a grain have produced marked results.—*L'Abeille Médicale*, Jan. 26, 1885.

New Apparatus for Transfusion of Blood.

Dr. VLEMINCKX attributes the success of the operation performed by him to the perfection of the apparatus employed, a description of which is given in detail:

The apparatus of Dr. Casse consists of a graduated cylindrical receiver, capable of containing about four ounces and a half of defibrinate; to the lower extremity of this cylinder a rubber tube, about a metre in length, is fitted. A section of glass tubing, in the rubber, enables the blood to be seen during operation. The end of the rubber tube is so arranged as to fit the canula which is introduced into the vein. To operate, blood is drawn from the donor, and whipped about fifteen minutes with a small rod, and the fibrin thus collected is removed. In the mean while the vein of the patient is exposed, and the canula introduced into which the tube is shortly to be fitted. All being in readiness, there is placed in the graduated vessel a funnel covered with flannel, upon which the defibrinated blood is poured little by little until it reaches the distal extremity of the rubber tube, it is fitted into the canula, and the operation begins. It is certain no air can enter the vessels, and the orifice of the canula, which is almost a capillary tube, permits the blood to enter with extreme mildness. The vessel containing the blood is placed a little above the level on which the patient lies, so that by the force of gravity only the blood is made to enter the vein. Any fibrin which has chanced to remain is retained by the flannel upon which the blood is poured. When the vessel is empty, the tube is withdrawn from the canula, and the air is thus excluded from the vein. This done, the canula is removed from the vein, and a dressing applied over the part. The advantages of this method are numerous. By the precautions taken air is prohibited from entering the vein, as is also the fibrin; the extreme gentleness with which the blood enters the vein permits the current to adjust itself to the new supply. Finally, by using the apparatus it is possible to operate extemporaneously without having recourse to warm vessels, which must be kept at a uniform temperature when blood not defibrinated is used. Further, the microscope shows that the blood-globules are not altered in shape, and the results obtained prove that they have lost none of their properties, and that the introduction of them alone without fibrin is sufficient to restore vitality. —*Revue Médicale*, Jan. 2, 1885.

MEDICINE.

The Etiology of Asiatic Cholera.

Gazetti Degli Ospitali, 1884, No. 92, contains a *résumé* of the conclusions reached by CECI and KLEBS, after their investigations as to the etiology of Asiatic cholera. They are as follows:—

(1) The common bacilli are not regularly found in the choleraic discharges, or in the colon of those dying from cholera. For this reason, if not their pathological significance, at least their diagnostic value is questionable.

(2) If the common bacilli are found in the discharges, they are always mingled with short spirillæ, which exhibit the union of two or three bacilli.

(3) If the bacilli-containing discharges are permitted to stand at an ordinary temperature, on the second day the spirillæ increase considerably in size and number; on the third and fourth days, a true pure culture of spirillæ, some of which are of extraordinary length, shows from ten to thirty curves. During the following days the spirillæ diminish rapidly, and are replaced by some oval and somewhat long, putrefactive, schizomycetæ. (C.)

(4) The same bacilli may originate from division of the spirillæ. Under the microscope spirillæ may be plainly seen, which, while dividing into five or six

bacilli at one end, at the other maintain their continuity. Probably, therefore, the spirillæ, while they are lengthening, form the common bacilli. Spores, latterly, were not found. (C.)

(5) During the growth of the spirillæ the discharges remain alkaline or neutral, and the reaction does not change by the progress of decomposition, even if the spirillæ and bacilli are not more directly recognizable.

(6) The prime invasion of cholera is confined to the intestinal canal. Neither the blood, spleen, liver, nor kidneys contain bacilli or other micro-organisms.

(7) Even in the algid state of expiring patients no common bacilli are found in the breath.

(8) Even in the algid state no morphological changes are found in the blood, except an increase in the white blood and a darker appearance of the red corpuscles, in consequence of cyanosis.

(9) Though no bacilli could be directly discovered in discharges in which putrefactive changes had occurred, they, however, were recognized after pure culture had been made. (C.)

(10) The symptoms—death and tissue change in cases of cholera, running in a rapid course—are not explainable by the insignificant intestinal lesions which are present. In entirely recent cases no common bacilli were found in the follicles of Lieberkühn; nevertheless the mucous membrane was, to a great extent, perforated by lymph-cells. (K.)

(11) The most important anatomical lesions are found in the kidneys, which externally have no abnormal appearance outside of the pale color of the cortical substance. If the preparations are colored with gentian violet, it is seen that the uriniferous tubules are either not colored or else easily lose the staining in alcohol, and that the medullary substance entirely fades, or else contains only a trace of the coloring material. The epithelium has undergone coagulation necrosis. (K.)

(12) Ceci affirms that the common bacilli and the spirillæ of Asiatic cholera are morphologically identical with the bacilli and spirillæ which Finkler and Prior have exhibited from the culture of cholera morbus, and brought to Genoa. Klebs has seen the same forms of spirillæ in the diarrhœa of pneumonic patients.

Both Ceci and Klebs arrive at the conclusion that in Asiatic cholera there is probably developed a substance which the cell protoplasm seizes upon; that this substance, which probably is formed by agency of the spirillæ in the intestine, is absorbed, and in slight concentration produces an atrophic condition of the tissues (spleen, liver, skin, etc.), and in stronger concentration, a direct necrosis (as in the spleen). A series of severe nervous manifestations is to be considered as uræmic, as Maragliano also assumes.

Arterial thrombosis—the drying of the conjunctiva, pericardium and skin, are to be attributed to the decreased cell activity. They see proof of the correctness of these views, in the fact that all these pathological appearances were observed in cases of cholera sicca, which in Genoa were especially numerous.

Further investigation will be made with the object of recognizing the poisonous principle.—*Centralbl. für Klin. Med.*, Jan. 10, 1885.

New Therapeutic Researches upon the Asiatic Cholera of 1884.

Dr. M. SEMMOLA, Professor in the University of Naples, and Chief Physician of the Hospitals, in an important communication to the *Bulletin Gén. de Thérapeutique*, December 15, 1884, expresses the following views on cholera and its treatment.

Even while admitting the theory of the microbe, according to the conclusions of Dr. Koch, yet I am convinced that that theory can never be taken as a point

of departure for the rational and scientific treatment of cholera. Hence, I do not hesitate to conclude, after observations made upon a large scale, that the anti-microbe or anti-parasitic treatment is not at all, and never will be, the proper method by which to arrest the development of the disease, and for the following reasons :—

(a) Because the best known and most powerful parasitic-destroying agents can never be introduced into the intestinal canal in proportions necessary to kill the microbe, without danger to the patient.

(b) Because, even if one could introduce into the jejunum a sure parasiticide, inoffensive to man, the death of the microbe would constitute but a small portion of the treatment, because the principal phenomena of cholera are undoubtedly due to a chemical principle (ptomaine), which poisons successively the nerve-centres, and which is in the course of formation in the intestine when the diarrhœa advises us that the choleraic attack has commenced. I believe, also, that the diarrhœa itself, from its beginning, instead of being an irritating effect due to the microbe, cannot be looked upon as the first result of the poisoning of the abdominal sympathetic nerve-centres, through their incontestable influence upon the circulation, and the nourishing of the intestine.

It is possible thus to explain perfectly the hyperæmia (*rouge horticola*) of the mucous membrane, the profound change in the intestinal epithelium, and the disturbances of secretion which constitute the first stage of the sickness.

Hence, even admitting the parasitic point of departure, the infection due to the microbe would begin its deadly work in the intestine, as a hidden enemy, who prepares the materials of its attacks, which are then absorbed, in order to produce progressively the poisoning of the different nerve-centres presiding over the functions successfully disturbed.

Anti-parasitic treatment, recommended hitherto, is but scientific charlatanism. Experiments prove nothing.

The specific remedy in cholera has not yet been discovered, and never will be by means of laboratory investigation.

It is an error to confound the infection of cholera with the infection of marsh fever. The two diseases, in Cochin China, raging at the same time, were distinguished from each other by the salts of quinine curing marsh fever, and having no effect on cholera.

There are only two ways to treat cholera, *i. e.*, the symptomatic and the physiological treatments.

By symptomatic treatment the physician should endeavor to combat the symptoms as they arise by the administration of medicinal substances which presumably exert an influence opposed to the conditions observed. Thus, for example :—

Intestinal flux : astringents.

Weakness : stimulants.

Algidity : artificial heat ; alcohol.

Paralysis of the heart : injections of sulphuric ether, or other substances.

But if the physician, seeing the persistence and the aggravation of the symptoms as they arise by the administration of medicinal substances which presumably exert an influence opposed to the conditions observed. Thus, for example :—

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But if the physician, seeing the persistence and the aggravation of the symptoms as they arise by the administration of medicinal substances which presumably exert a disturbing action upon the economy, he aggravates the condition of the patient. This is conspicuously evident in the use of such remedies as atropia and strychnia. Physiological treatment is most to be considered. It comprises such means as, without exercising a disturbing influence upon the system, may fortify it against the invasion of the choleraic poison.

Under this head may be considered :—

(a) Absolute rest of the organs attacked, that is, of the gastro-intestinal canal, by complete fast as soon as the first diarrhœic symptom is manifested. I

do not think this point has been sufficiently dwelt upon, and I repeat that after the first appearance of diarrhœa, even the smallest quantities of ingested food constitute a veritable mitrailleuse, which we put into the hands of the enemy. This functional rest should be continued until complete reaction has set in. I have observed that milk, in small quantities, is the most preferable substance with which to begin alimentation.

(b) Stimulate the economy opportunely by physiologically therapeutic means. Heat, applied in the form of warm baths (temperature of $100\frac{1}{2}^{\circ}$ to 104° F.), repeated according to necessity, answers the requirement. I have said *opportunely*. The most favorable time to use the hot bath is before the algid condition has begun, because it is impossible to restore the heat to a cutaneous surface, once so chilled. To maintain the good effects of the warm baths, they should be repeated in from one to two hours, according to the judgment of the physician, and the patient should afterward be wrapped in coverings of wool and receive hot aromatic, or weak alcoholic drinks.

Should a patient, suffering from even a slight diarrhœa, begin to experience epigastric pain, with or without vomiting, the hot bath is to be renewed without delay, and continued ten or fifteen minutes.

Further, in cases of simple diarrhœa without epigastric symptoms, which are rebellious to the initial treatment (rest, absolute fast, opium, tannin, etc.), I advise the hot bath, with necessary precautions. I have seen hundreds of cases rebellious to treatment for several days, yield to one or two hot baths, followed by abundant perspiration.

(c) To administer small doses of opium (laudanum, Batley's sedative drops, chlorodine, etc.), to stupefy the nervous centres, and render them less susceptible to the toxic principle of the disease, apart from the favorable influence the opium may exert by means of its action upon the morbid secretion of the intestinal mucous membrane. In the period of reaction the treatment should be very simple. If reaction come on gradually, and without much fever, the treatment should be strictly hygienic and dietetic, and alimentation should be resumed with great care and prudence. If, on the contrary, the reaction supervene suddenly, and with high fever, an antipyretic treatment should be resorted to, based upon the application of cold compresses; and if the fever is persistently above 104° , the general application of cold, such as is recommended in infectious fevers, is indicated. I would again recommend milk as the best aliment, especially if with the fever there are gastric complications, such as cramp, pain, and vomiting.

I have never found medicinal substances administered internally whose effects could be regarded as truly antipyretic.

In reactive periods there attaches great interest from a clinical point of view to the persistence of the symptoms connected with the functions of those organs most affected during the evolution of the disease, such as cardiac weakness, epigastric pain with anorexia, as well as the persistence of a slightly cyanotic color, along with which the patient experiences great feebleness. In this condition, the treatment furnished by rational therapeutics is valuable. Since the choleraic poison no longer remains in the system, and prevents the proper action of the drugs employed, accordingly, I recommend hypodermic injections of the salts of caffein in cardiac weakness; the salts of strychnia for epigastric pain, and small doses, hypodermically, of valerianate of quinine, and inhalations of oxygen in the condition of persistent sub-cyanosis.

Intra-Peritoneal Styptic and Sedative Injection in Cholera.

DR. BENJ. W. RICHARDSON, in the *Asclepiad* for Jan. 1885, among other modes of treatment of cholera, suggests intra-peritoneal injections. He says:—

I have now to propose for the first time a much bolder and more radical method of treatment by the peritoneum.

In my experimental researches on the synthesis of rheumatism, I found that dilute solutions of lactic acid could be introduced by the peritoneum, without creating any such degree of local lesion as was expected. I believe, therefore, that in extreme cases of cholera the peritoneum might well be used for the direct reception of astringent and sedative remedies.

A water solution of tannin, made by adding a scruple of tannin to a pint of warm distilled water, with ten minims of solution of opium, equalling a grain of opium, might be injected into the peritoneum with the utmost safety, and, I think, with good effect. The tannin would dialyze rapidly into the intestinal canal through the intestinal membranes, and would exert an instant styptic action by arresting the profuse secretion; while the opium, also quickly diffused and absorbed, would be most valuable as a sedative.

I name tannin as the styptic in this case, because of its freedom from irritating properties, and because, in the body, it is transformed ultimately into a perfectly harmless product—grape-sugar—which would find its exit from the body by the urine, unless it were used up in combustion as a hydrocarbon. This same plan might be used with hopeful results in the last stages of typhoid, especially when those stages are accompanied by profuse hemorrhage.

In the use of the styptic solution the ordinary small hypodermic needle could be employed, the quantity of fluid wanted for injection being small, and the course of the injection slow. The rapidity of the dialysis from the intestinal surface into the intestinal canal would, I opine, safely prevent the action of the styptic on the blood in the underlying large abdominal veins, the only great source of danger from the operation.

Contribution to the Study of Laryngo-Typhus.

Dr. PAUL KOCH, after an exhaustive study of laryngo-typhus, arrives at the following conclusions:—

1. True laryngo-typhus has an actual existence; it coincides always with the acute period of the general disease.

2. If symptoms of laryngo-stenosis are manifested during the period of convalescence from typhoid fever, they are an expression of perichondritis, which is generally manifested in acute attacks of the disease of long duration.

3. Operation is indicated as soon as the symptoms of laryngo-stenosis become persistent.

4. It is always necessary in performing deep tracheotomy to avoid the cricoid region.

5. It is necessary to abandon the perichondrial and peri-laryngeal inflammations to their natural course, which is very long, and not to attempt to hasten their cure.

6. If after recovery the patient is unable to pass a canula, two methods of treatment by mechanical resources remain, and, as a last resort, resection of the larynx may be performed.—*Revue Mensuelle de Laryngologie d'Otologie et de Rhinologie*, Feb. 1885.

Carbolic Acid in Typhoid Fever.

In the February number of the *Archives Générales de Médecine* of the present year, Dr. ALBERT ROBIN strongly urges against the use of carbolic acid in the treatment of typhoid fever.

The conclusions reached by Dr. Robin in his paper are the following : First he maintains that the administration of carbolic acid frequently produces the following unfavorable manifestations :—

1. Nervous symptoms, such as ataxic phenomena, convulsions, chills, and trembling.
2. Pulmonary complications.
3. Nausea, vomiting, and colic.
4. Profuse perspiration, which not being critical is useless or dangerous.
5. Symptoms of more profound intoxication, frequency, smallness, and compressibility of the pulse, cyanosis of the extremities, collapse, and sudden death.
6. Secondary effects, evinced by cachexia, anæmia, and cirrhosis. (Ramonet Gérardin.)

These effects, according to Dr. Robin, are directly due to the drug, and he maintains that the carbolic acid continuously employed in full doses exercises a deleterious effect upon the chemical composition of the liquids and tissues of the body by removing from them elements in the highest degree important.

Concerning this chemical action Dr. Robin draws the three following conclusions :—

1. Typhoid fever produces and eliminates more carbolic acid, sulphuric acid, and potassium than any individual, however well and adequately nourished.
2. The loss of sulphuric acid and of potassium being insufficiently compensated for by the nutriment consumed by the patient, the result is that the organism is the more impoverished of these elements, the longer the disease persists.
3. This impoverishment is caused by a process incident to the disease, and should be properly considered as one of the causes of malnutrition so frequently manifested during convalescence from this disease.

What, then, Dr. Robin asks, in view of these facts, results if, during the course of the fever, considerable quantities of carbolic acid are introduced into the system ?

To this question, the writer replies by advancing clinical facts carefully observed in proof of his views, as follows.

The tendency to impoverish the organism of sulphur and potassium, which is considerably increased during the typhoid condition by the administration of carbolic acid, may be estimated at an additional loss of more than 7 grains of sulphuric acid and more than 3 grains of potassium for every gramme of carbolic acid taken by the patient. The entire daily loss, accordingly, for a patient of average weight to whom a maximum amount of the acid has been administered, would amount to nearly 100 grains of sulphuric acid and 40 of potassium. On the strength of these data, M. Robin proscribes carbolic acid from the list of remedies for typhoid fever, as also all other organic substances which are eliminated in the same manner.—*Revue Médicale*, Feb. 14, 1885.

A Case of Acute Rheumatic Polyarthritis in a Child thirteen weeks old.

An interesting and unusual case of rheumatism in a child thirteen weeks old is reported in *Prag. Med. Wochenschrift*, 1884, p. 410 :—

The child in the second month presented symptoms of beginning rachitis. It became ill when twelve weeks old, and a swelling of the right shoulder-joint with pain and redness was manifested. On the fifth day of illness, after a gradual and regular elevation of the temperature to 102.2° F., the ankle-joint was attacked ; on the sixth day, the left knee-joint ; on the ninth, with a temperature of 101.8° F., the right elbow-joint. On the twentieth day motion in all the joints was possible. Death occurred on the thirty-fourth day from a right-sided pleuro-pneumonia.

Post-mortem examination, in the absence of either traumatic origin of the disease, tubercular or syphilitic diathesis, confirmed the clinical diagnosis.—*Centralblatt für Klin. Med.*, Feb. 7, 1885.

Pulmonary Manifestation in Rheumatism.

M. LEBRETON, in a thesis lately published, gives a clear and erudite exposition of the pulmonary symptoms frequently manifested in rheumatism and arthritis. Such manifestations generally precede the local appearance of the disease by a few days, and rarely also are isolated and unique, forming the only phase of the attack. They may also occur without implication of the heart. The writer holds that the term "rheumatic pneumonia" should be abandoned as a misnomer, inasmuch as there is never present a true pneumonia. The affection presents many characteristic features; the face of the patient, instead of being flushed and red, is pale, the body is bathed in acid sweat, and the stethoscopic symptoms are fugacious and variable. The disease is ordinarily not dangerous, but may return frequently. Besides the pneumonic form there is also an œdematous variety which may have slow progress with dyspnoea, distressing cough, and abundant expectoration, or be fulminant in its nature. The arthritic manifestations of the disease are characterized by hæmoptysis and remittent attacks—a true pulmonary gout—of which the crises are habitually nocturnal and associated at first with a dry cough, followed afterwards by stringy and frothy expectoration and considerable nasal discharge. During the day the patient is entirely free from all discomfort, but at night the attacks return to disappear as suddenly as they began. The "arthritic bruit," M. Lebreton considers, with Woillez and Huchard, to be rather a congestion than a pleural friction.—*Gazette Médicale de Paris*, Jan. 17, 1885.

The Therapeutic Value of Iodoform in the Treatment of Gout.

Dr. TESTA, after extended experimental investigation and clinical observation upon the effect of iodoform in gout, arrives at the following conclusions as to its physiological effects and as to its value in the treatment of this disease.

1. Iodoform augments the daily quantity of urea eliminated with the urine, and thus increases the amount of organic change by hastening the process of oxidation.
2. It diminishes the daily quantity of uric acid, which by excessive nitrogenous diet is passed with the urine, because by hastening the process of oxidation it does not facilitate the metamorphosis into urea.
3. It diminishes oxaluria dependent upon the introduction of aliments rich in oxalic acid, because, owing to the increased oxidation, this acid is changed to carbon dioxide and water.
4. In gout it diminishes the quantity of uric acid in the blood by increasing oxidation in the economy.
5. Iodoform is a rational remedy for gout, because, by removing the uric acid from the blood, it fulfils the conditions necessary for the cure of the disease.

The conclusions reached from clinical experience in the use of the drug are as follows:—

1. Iodoform has generally a very beneficial effect upon gout, reducing the number of the attacks and diminishing both their intensity and duration.
2. In cases where gout is complicated with renal disease, caution is necessary in its administration, since, if its elimination is more or less retarded, or prevented, an unfavorable cumulative effect may result.

3. In kidney disease, therefore, the drug must be carefully administered or entirely discarded according to the extent of the renal lesion.

Apropos of the foregoing conclusions, Dr. Testa suggests the following points for the consideration of other observers:—

1. Whether in some cases iodoform may effect a radical cure of gout.

2. Whether, and to what extent, it may be used to resolve deposits in the joints, due to gouty diathesis.

3. The determination of the nature and extent of renal disease which contraindicate its use.

4. The study of the simultaneous and successive effect of the stigmata of maize and of iodoform, in order to arrive at a definite conclusion, whether the two remedies combined, by modifying the catarrhal condition of the kidneys, are rendered more tolerable than the iodoform alone.—*Gazetta Medica di Torino*, Feb. 15, 1885.

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Persistent Hiccough cured by Jaborandi.

Dr. PAGENSTECHER reports a case of persistent hiccough cured in six days by a decoction of jaborandi after all other remedies had failed to exert any effect. The intervals between the attacks gradually became less, the contractions of the diaphragm varied from sixteen to twenty, to thirty and forty per minute. The pulse was very variable, ranging from 100 to 120 to 60 or 70. Respiration was frequent, averaging about 24 per minute. The patient was haggard, and during the last three days had not eaten for fear of vomiting.

During the progress of the disease, no remedy exerted any influence whatever. Finally faradization was tried and seemed at first to give good results. Improvement was, however, but temporary, and the hiccough became worse. As a last resort jaborandi was tried. A decoction of the leaves was made, and its administration was followed by its prompt therapeutic action. Perspiration continued about two hours, and at the end of that time the hiccough disappeared.

The therapeutic action of the drug is explained by Dr. Pagenstecher, by supposing that perspiration produced a molecular transformation in the phrenic nerve and the tissues adjacent, which enabled the nerve to resume its normal function.—*Bulletin Général de Thérapeutique*, Jan. 30, 1885.

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Inoculation of Tuberculosis in a Woman.

E. A. TSCHERNING (*Hospitals-Tidende*, December 17, 1884) records the following interesting case, which has a valuable bearing on the theory of inoculation of tuberculosis.

Maria P., æt. 24, cook, in the service of the late Professor H., who died at the end of July, 1884, of florid pulmonary phthisis, from which he had been suffering for five or six months. His expectoration was, toward the end of his life, an almost pure culture of tubercle bacilli in pus. The girl was perfectly healthy and strong, had never suffered in any way from serofulous or tuberculous diseases, and had no hereditary disposition to tuberculosis. A few days before the death of Professor H., the girl, pricking herself with a piece of glass from a broken cuspidor which he had used, inflicted a small wound on the volar surface of the first phalanx of the left middle finger.

A fortnight later, she presented herself before Dr. Tscherning with a beginning panaritium. After the application of compresses with a solution of carbolic acid the symptoms abated somewhat. There occurred no suppuration, but in the subcutaneous areolar tissue was felt a small lump scarcely of the size of a split pea, which remained stationary for several weeks, accompanied by œdema and

moderate soreness of the surrounding tissue. A small incision was made at the end of August, and the small lump composed of granulations between the sheath of the tendon and the skin was scraped out. The wound healed by the first intention under a dressing of iodoform and corrosive sublimate, and the patient improved provisionally.

In the beginning of October, she complained of pains on flexion of the fingers. The skin and the subcutaneous tissue of the phalanx and the adjacent part of the vola of the hand were slightly swollen. No distinctly limited swelling of the sheath of the tendon could be felt. The patient used local steam baths for a few weeks, and when she called again, in the middle of October, a distinct thickening of the sheath of the tendon could be felt. The mobility of the finger was diminished, and it was the seat of moderate pain and sensitiveness. At the same time there were found two swollen glands at the elbow and two in the axilla of the same side. Otherwise she was perfectly well, and especially showed no trace of pulmonary symptoms.

On the 21st of November the swollen glands were extirpated, the finger was exarticulated at the metacarpo-phalangeal joint, the palmar skin was slit open, the tendon with its swollen sheath was removed up to the middle of the hollow of the hand, and the subcutaneous granulations present were cut out with scissors or scraped out with a curette. The operation was performed by Professor Studsgaard with a 1 : 1000 solution of corrosive sublimate for antiseptic, and the wound was dressed with gauze impregnated with the same substance. It healed by the first intention in eleven days.

The pathological changes found were as follows: The sheath of the tendon was closed with pale granulations. The serous cover of the tendon was studded with petechiæ. No pus, cheesy masses, articular or bone affection were found. Under the microscope, the granulations, after hardening in alcohol and staining with picrocarmine, showed very numerous elementary tubercles, sometimes with cheesy degeneration of the centre, numerous large cells, and beautiful partly central giant-cells. The extirpated glands looked to the naked eye like common hyperplastic glands without pus or cheesy substance. The microscope revealed hyperplasia due to large cells with interspersed elementary tubercles. In *all the sections*, both of the granulations on the sheath of the tendon and of the lymphatic glands, were found distinct tubercle bacilli demonstrable by means of Chelich's staining method. They were partly imbedded in epithelioid cells or giant-cells, partly situated at the confines of the microscopical necrobiotic spots. Most frequently they were isolated, but here and there two or even three were found together forming a more or less open V. Often they contained spores.

The author adds that these conditions correspond entirely with what he has found in about thirty cases of local tuberculosis (arthritis, tenositis, spondylitis, pyogenic membranes, lymphatic glands, testicles, tongue, pyelonephritis).

Spontaneous Peritonitis.

In an interesting paper in the *Deutsche Med. Wochenschr.*, 1884, No. 17, Prof. E. LEYDEN remarks that the occurrence of idiopathic peritonitis, though very problematic, has so far been demonstrated by post-mortem observations, especially in Germany, that the text-books now speak with great caution on this matter. The study of the literature of the subject affords reason to believe that the appearance of peritonitis of a spontaneous origin is not so rare as has been supposed. Leyden has himself had under observation "three cases in which there was no possibility of a mistake in diagnosis."

Spontaneous peritonitis appears more frequently in women than in men, and seems to be coincident with certain mal-conditions of menstruation arising in cold and in inflammation of the colon. The nature of the disease points to an infectious origin through micro-parasites, but microscopic examination does not always reveal them in the same form. The question then arises whether peritonitis may not be treated by operative procedure. The difficulty here lies in the washing out of the peritoneal cavity, and in seasonable diagnosis. Exploratory puncture, which in other cases is so valuable as an aid to diagnosis, is here unreliable, since as a rule there is not a very abundant exudation, and the meteorism coexisting renders it much more difficult to obtain fluid for examination.

SIMON, P. GUTTMANN LITTEN, LANDAU, and ISRAEL further discuss the subject from the same standpoint as Leyden. The first three produce data from their experience, which renders the spontaneous origin of peritonitis probable. Landan gives as his conviction that the infection is from without, and that it is often difficult to find after death the location where infection took place. In this light he considers that a spot of ulceration and perforation in the vermiform process, which has healed, simply erosion of the mucous membrane of the colon, which can, in a short time, not be detected; and also the transference of gonorrhoeal inflammation along the Fallopian tubes, or through the uterine lymphatics. Landau holds that in operative treatment of peritonitis an incision should be made, and the full benefit of thorough rinsing and drainage of the peritoneal cavity be thus obtained.

Israel also thinks the operative treatment by incision advisable, and cites two cases in which he successfully practised this method. In one he operated by incision and thorough washing of the peritoneal cavity; in the other he punctured Douglas's *cul-de-sac*.—*Centralbl. für Chirurgie*, Dec. 20, 1884.

Nephritis and Uterine Epithelioma.

Dr. E. LANCERAUX bases an article on the renal complications of epithelioma of the uterus in twenty-three cases. The first part of his paper is a report of the cases. He then gives a clinical description of epithelioma of the uterus, the only one of the carcinomatous affections of the uterus which he desires to consider, since it is the only one which presents a certain degree of curability. Furthermore, the seat of predilection of epithelioma at the beginning, as well as its manner of spreading, marks out the course to be pursued by the surgeon; when limited to the cervix, and no complication exists, intervention must be as prompt as possible.

It was seen, in a recent discussion on cancer of the uterus in the *Société de Chirurgie*, that the preceding proposition, formulated by Lanceraux, is identical with the opinion of the great majority of French surgeons. It is a general rule, applicable to carcinomata of the uterus as well as to those in other places. Gallard holds that they should be extirpated whenever there is even a hope that the whole of the diseased part may be removed; and on this point it seems to him that there should be no hesitation on account of fear of return.

It is Lanceraux's opinion that the vaginal *cul-de-sac*, and perhaps more often the lips of the os, which is the point of departure of the epithelioma. The progress of the neoplasm implies a double action: the process of development, and that of ulceration, the first tending to the progressive extension of the disease, the second to the destruction of the tissues and to serious complications to be enumerated later. In a word, epithelioma is represented, at the beginning, by a production in relief, a sort of mammilated vegetation, which is extended by the multiplication and infiltration into the neighboring epithelioid cells (epidermic

globes), which represent the fundamental element. At the same time, the parts first attacked undergo regressive metamorphoses, whence results a more or less extensive ulcer, always circumscribed by an inverted edge, markedly hardened and very characteristic. The functional disorders accompanying this morbid evolution are numerous. First among these are the hemorrhages, shown at the beginning only by a menorrhagia, but which, later, become so abundant as to constitute metrorrhagia, and are successively complicated by white, mucous, reddish, bloody, and very fetid discharges. Digestive troubles then appear, impairing the general nutrition of the patient.

In regard to the disorders of the urinary organs, says Lanceraux, the urine becomes bloody as soon as the vegetation invades the base of the bladder; later, when the vegetation becomes ulcerated, and especially when there is retention of urine, it becomes purulent. Then, when there is obstruction of the ureters only at their outlets, the urine becomes pale, and the specific gravity is lowered; and the solid matters are reduced. In many cases, also, albumen is found in the urine. From a clinical point of view these urinary troubles are almost constantly complicated by aræmic accidents; *uræmia of the digestive apparatus*, so to speak, cerebral uræmia, respiratory or dyspnœic uræmia, more rare than the preceding forms. This symptom, ordinarily accompanied by a reduction of the temperature by one or two degrees, is usually the cause of death, unless this takes place prematurely from some special complication, as hemorrhage, peritonitis, etc. It always occurs in an advanced stage of the disease, and should be considered a symptom of serious importance.

As regards the lesions observed, Lanceraux classes them as *primary, secondary, and tertiary*: the first are situated in the uterus, vagina, and the corresponding lymphatic glands; the second proceed from the first, principally from the extension of the disease to the bladder and the ureters, and especially affecting the pelves of the kidneys. The third class consist of various modifications of the digestive tract and of the heart.

Lanceraux explains the progress of the carcinomatous affection on anatomical grounds. It is, so to speak, regulated by the intimate connections between the genito-urinary organs. The upper portion of the cervix uteri and that of the vagina are connected with the base of the bladder by dense cellular tissue. What is more natural, then, than the extension of the neoplasm to the bladder? This extension takes place through the intermediation of the epithelial tracts conducting to the formation of embryonal connective tissue in the midst of the compact tissue uniting the vagina, uterus, and bladder. The morbid process extends to the ureters, slowly causing contraction, from which there is a natural succession of accidents: stricture of the ureters, consecutive dilatation of these tubes, which attain the size of the small intestine, distension of the pelves and calices, and atrophy of the papillary extremities of the pyramids of Malpighi.

The renal lesions are subordinate to the duration of the utero-vesical lesion. They consist in more or less marked cirrhosis, but this must be differentiated from primary interstitial nephritis by the state of the free surface of the organ, which is brilliant, yellow, and smooth: from saturnine arterial nephritis, in which the free surface of the kidney is granular, and in which the pelves and calices are never dilated, nor the Malpighian pyramids effaced. The histological lesions are also those of diffuse cirrhosis, especially marked at the seat of the Malpighian pyramids. The process extends to the cortical substance, at the level of which the different lobules are limited by fibrous rings. In the excretory canals the epithelium is clouded, and forms refracting particles, modifications which exist in a high degree in the collecting tubes of the pyramids, and to a less extent in the convoluted tubes. Marked histological alterations are also seen in

the digestive organs. The stomach is retracted, the mucous membrane thrown into folds and more or less injected, disseminated sclerosis is present, and the mucous membrane is covered with a viscid and very adherent mucus. The small intestine is also lined with a thick layer of mucus, but the mucous membrane is pale and discolored; that of the large intestine is slate-colored in places, more rarely ulcerated or surmounted by small furuncular nodules.

Lanceraux concludes that in interstitial nephritis or primitive sclerosis, hypertrophy of the heart is forcibly under the immediate dependence of the alteration of the arterial system, and not, as a certain number of authors think, subordinated to the renal lesion.—*Annales de Gynécologie*, October, 1884.

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Occlusion of both Ureters by Renal Calculi. Anuria for Twenty-three Consecutive Days.

Dr. ERNST BISCHOFF publishes the following remarkable case, which was under his care, in connection with Prof. von Ziemssen.

The patient was a man 58 years old, who for 14 years had suffered from gout and lithiasis. He had collected in the course of this time a great number of renal calculi of various sizes which had passed with comparatively little pain. About the end of September, 1883, he became ill, and severe pain developed in the region of the left kidney. This in a few days moderated, but did not entirely disappear. The urine in the mean while was bloody at intervals.

This condition persisted for two weeks, when the patient was compelled by the advent of fever and consequent debility to remain constantly at home. About the middle of October phlebitis of the saphenous vein in the left leg appeared, and finally extended to the thigh, thus involving the whole extremity. All this time he suffered much pain in the region of the left kidney, and his urine was sparingly voided, frequently contained blood, and always albumen. At the end of October he was entirely convalescent, and by the end of November was able to attend to his business.

On *Jan. 25th*, 1884, he passed, while urinating, a calculus somewhat larger than a pea without difficulty. On Friday, April 25th, the patient took a long walk, and on his return home, five hours after, on attempting to urinate passed an enormous quantity of blood, without, however, suffering any immediate inconvenience therefrom. Shortly the pain in the neighborhood of the left kidney returned, but passed away during the night; in the morning he was able to go to his office, his appetite during the day being excellent. In the evening of January 26th, his pain returned, and at this time Dr. Bischoff was called to see the patient. His condition was generally favorable, the heart slightly enlarged, its impulse weakened. The patient was a moderate beer-drinker, and the condition of the organ was diagnosed as one of fatty degeneration. Examination revealed pain increased by pressure over the left kidney, and considerable swelling in this region was also manifest. No urine had been passed the whole day. Moist application to the swollen parts and appropriate drinks had a favorable effect, and the following morning at 7 A. M. about one-half pint of urine was passed. Examination showed the presence of albumen.

Jan. 28th. The patient went to his office, having but little pain. No urine was passed the whole day, and on examination with a catheter the bladder was found empty.

29th and 30th. No urine was passed, condition of patient otherwise good. Diagnosis was accordingly made of occlusion of both ureters, and appropriate treatment by diaphoretics and diuretics instituted, and continued from this time on.

May 1. Condition of patient favorable, but anuria persisted.

2d. Less than a cubic inch of urine passed, very dark and bloody. A hot bath of 99½° F., followed by the dry pack, was given.

3d and 4th. Same treatment.

On the evening of the 4th, slight œdema of the joints was noticed. No urine voided, bladder empty.

5th. There appeared a troublesome abdominal tension, which passed away after some evacuation of the bowels.

6th to 10th. Condition of the patient unchanged. Appetite good, but eating was followed by persistent hiccough. No urine passed.

The night of November 10th, fever suddenly developed, and with it severe stomatitis, which prevented the patient partaking of food. Œdema also appeared in the legs and gradually extended to the abdomen. General condition of the patient better.

15th. Pain again suddenly returned in the region of the left kidney, and the patient was dull, ate little, and frequently was inclined to vomit.

16th. While at stool patient passed a little less than a gill of urine, which was bloody, acid in reaction, and of normal odor. Pain still persisted, the patient was apathetic, had no appetite, was very thirsty, and the tongue dry. Much inclination to vomit.

17th. Pulse between 104 and 102. Temperature of the skin very high. Urine still suppressed. Patient apathetic, somnolent, and gradually becoming unable to converse.

18th. Patient restless, and delirious; pulse irregular. Œdema had increased, and pain over both kidneys considerable.

19th. Respiration difficult from collection of mucus in the trachea. The patient, though somnolent, could be roused, and would then answer correctly, if questioned. Grew worse during the day, and died at 4 P. M., comparatively easily. At no time was urea detected in the secretion of the skin, though it was daily sought for, neither at any time were convulsions observed.

The post-mortem, held May 20th, showed the presence in each ureter of a renal calculus.

That in the right ureter was about 3 inches from the pelvis of the kidney firmly impacted, about 1 inch in length, and $\frac{2}{3}$ of an inch in diameter at its greatest circumference. The remaining portion of the urethra was normal. The kidney itself was much contracted and the pelvis dilated. The left kidney had undergone compensatory hypertrophy and showed the existence of suppurative nephritis. The pelvis was dilated and contained a bloody fluid and some small calculi.

The ureter at its commencement was greatly dilated for nearly 4 inches; at the end of this dilatation a collection of small calculi ten or twelve in number was found in the ureter, which was slightly inflamed. About one-half inch further on, a calculus, the size of a large bean, completely occluded the ureter. The remaining portion of the ureter empty and normal.

The bladder itself was contracted, and contained only a few drops of dark-colored urine.

As far as is known, this case is without precedent, the absence of uræmia and convulsions being very remarkable. In cases hitherto observed the prolongation of life beyond ten days, during complete anuria, is extremely rare.

The bibliography of the subject is appended and further confirms the unique character of the history recorded.—*Deutsches Archiv für Klin. Med.*, December, 1884.

SURGERY

Cancer of the Tongue.

At a meeting of the Medical Society of London Mr. F. BOWREMAN JESSETT read a paper on cancer of the tongue, with especial reference to the frequency with which the disease attacks this organ, its etiology and treatment. Of 2227 cases seen at the Cancer Hospital, the tongue was the seat of the disease in 190 cases, or about 8.5 per cent. Statistics collected by Sir James Paget, Mr. Sibley, von Winiwarter, and Mr. Barker were given and compared, and there was a general agreement in the results arrived at. Mr. Barker's statistics showed a higher percentage of cases of cancer of the tongue (16.3 per cent.), and this high rate might have been due to the large number of Welsh miners admitted to the University College Hospital. There was no organ in the body which is subjected to such rough treatment as the tongue, and this fact, combined with the surroundings of the organ, affords some explanation of the frequency with which cancer occurs in the tongue. Phthisis, syphilis, and hereditary tendencies were classed as the constitutional causes of cancer of the tongue. He believed that tubercular ulcers were disposed to become cancerous. He thought no one would deny the difficulty that frequently existed in diagnosing between tubercular, syphilitic, and cancerous ulcers of the tongue. He strongly advised excision of the tongue if treatment for a fortnight effected no benefit. With regard to the relation of cancer with ichthyosis, Mr. Morris had so thoroughly worked out this point that he should not treat further of it. Age had considerable influence on the development of the disease. The average age in the statistics he had collected was fifty-two, the youngest patient was thirty-two, and the oldest seventy-nine. Treatment was next considered, and as the disease was regarded as not purely local, he believed that some day a remedy for cancer would be found. Early removal of the nodule was strongly insisted upon, and the incisions should go wide of the disease. Division of the gustatory nerve and ligature of the lingual artery were of value in extreme cases. The various operations which had been practised for removal of the tongue, or a portion of it, were briefly reviewed. The operation for removal of the whole tongue was at least two hundred years old: Mr. Barker had found that in only 17 out of 170 cases had the patient been free from disease at the end of a year; in 639 cases operated on the death-rate was 20.7 per cent. An examination of all the published cases which were available had led him to the conclusion that no one operation yielded the best result in all cases. The death-rate after operations with the *écraseur* was 8.5 per cent., whereas that after the operation by scissors was 31 per cent. The *écraseur* was most suitable when the anterior part of the tongue was the seat of the disease, and the knife or scissors was the best when the diseased area was small. The difficulty of removing the whole of the growth when large by the *écraseur* was referred to, and a preference for the operation by ligature of the lingual artery and removal with the scissors was expressed. On the whole, however, the statistics spoke strongly in favor of operation with the *écraseur*.

Mr. FREDERICK TREVES thought that more might be said in favor of Billroth's operation of removal with the scissors preceded by deligation of the lingual arteries. The difference between the effects of the *écraseur* and the scissors was the contrast between a lacerated and an incised wound, and the contused state left after the action of the *écraseur* was necessarily followed by some sloughing. Salivation probably had a good deal to do with the foulness of the discharge from the mouth; he therefore recommended the excision of a short portion of the gustatory nerve. With the necessary precautions, he thought that Billroth's

operation was the one which could be carried out with scientific deliberation and care. He could not agree with Mr. Whitehead's practice of not ligaturing the lingual arteries.

Mr. BARWELL looked upon the scissors as a form of *éraseur*. It was very difficult to get at the whole of the diseased tissues when they were situated far back. He then described the operation which he had devised, and which allowed of the removal of the tongue as far back as the base of the epiglottis. The wound is made just above the hyoid bone, and through this opening the wire used in cutting is introduced.—*Lancet*, Jan. 31, 1885.

Malignant Stricture of the Œsophagus.

At a recent meeting of the Royal Medical and Chirurgical Society Mr. CHARTERS J. SYMONDS read an account of a case of malignant stricture of the œsophagus to illustrate the use of a new form of permanent œsophageal catheter. The patient, a man aged forty, who was exhibited wearing one of the tubes, gave a history of seven weeks' dysphagia before coming under treatment on June 23, 1884. At that time he was unable to swallow, and it was impossible to pass a bougie. He, however, on the day of admission managed to swallow some milk, and in a few days took fluids freely. The first tube was passed on July 15th. This was the usual long œsophageal catheter, and projected from the mouth. It proved a source of great irritation, and had to be removed in thirty-six hours. The long tube induced much laryngeal irritation, and by plugging the stricture prevented the descent of the saliva, and gave rise to constant expectoration. The tube brought before the society by Mr. Symonds was designed to remove these inconveniences while retaining the advantages of the method of treating œsophageal stricture by permanently wearing a tube. The gum-elastic tube is about six inches long; one end expands into a funnel having an outside diameter of one-half to three-quarters of an inch; the other has the same construction as an ordinary catheter. The tube is passed through the stricture, the funnel resting on its upper face, thus preventing the further descent of the tube. For removing it a piece of strong silk is attached, carried out of the mouth, looped over, and fastened behind the ear. The patient had worn the catheter since July 15th. It has been changed at various intervals—at first of a week, and later on of a fortnight and three weeks. No difficulty was experienced in removing the tube, nor did the patient suffer any inconvenience from its presence. The man can swallow fluids freely, and has gained in weight. The advantages claimed for this form of tube are that, while maintaining a passage into the stomach, it does not interfere with deglutition, produces no irritation, is not unsightly, and, moreover, retains to the patient the pleasures of taste. The man is able to move about with comfort, and, except for the silk passing out of his mouth, is not aware of the presence of the tube. It was suggested that if the cases of this disease were taken earlier a large tube might be employed, and the patients kept in comparative comfort, while at the same time the number of cases necessitating gastrostomy would be greatly diminished. It was the desire to avoid this operation, often so unsatisfactory, that led to the construction of the tube.—*Lancet*, Jan. 31, 1885.

Penetrating Wound of the Posterior Wall of the Stomach—Suture and Recovery.

G. TILING, in the *St. Petersburg Med. Wochenschr.*, No. 44, 1884, reports a case of penetrating wound of the posterior wall of the stomach, with the following history:—

Man, aged 19, received, while at supper, a direct thrust of a knife, producing a diagonal wound four-fifths of an inch long, an inch to the left side of the linea alba, and nearly three inches above the umbilicus. From the wound a portion of the omentum protruded. While suturing the wound, one hour after the injury, the patient vomited great quantities of chyme of a reddish color, and finally about a pint of pure blood, which later on happened again. Laparotomy was then performed, an incision about six inches in length having been made along the linea alba. A great quantity of blood escaped from the abdominal cavity, but no chyme was mingled with it. No wound was discoverable on the anterior wall of the stomach, but after a long search a diagonal wound was discovered in the left gastro-colic ligament, through which the finger could be introduced into the omental bursa. On feeling the posterior smooth wall of the stomach a slight inequality was discovered; further investigation showed this to be a wound through which the mucous membrane of the stomach protruded. The wound was two inches above the greater curvature of the stomach.

The mucous membrane was replaced and the muscular walls united by three silk sutures, and the peritoneum closed by four of Lembert's sutures. Owing to the collapse of the patient thorough cleaning of the abdominal cavity was impossible, since the abdominal wound was closed as soon as possible. The patient received for the first five days milk by the mouth. There was no fever, and recovery took place without interruption.

In addition to the interest attached to the case, and to the results attending the operation, it is still further worthy of note, because confirming, with all the exactness of direct experiment, the opinion now commonly held, that when the stomach is full, its greater curvature turns forward. It also is proven that the posterior wall of the stomach may be injured and the anterior remain intact. The favorable termination of the case is to be explained by the fact that the contents of the stomach escaped by the mouth, and did not enter the peritoneal cavity through the wound.—*Centralbl. für Chirurgie*, Jan. 17, 1885.

Incised Wound of the Anterior Wall of the Stomach.

Dr. FACHLIDES-REICHENBACH, in the *Deutsche Med. Wochenschr.* of Dec. 18, 1884, reports an interesting case of incised wounds of the stomach, which terminated favorably notwithstanding its serious nature.

A girl 7 years old, while carrying a wine-flask, fell, and the flask breaking and a fragment perforating the epigastrium, penetrated the anterior wall of the stomach. She was carried into a neighboring house, where a midwife, who was accidentally present, removed her clothing and applied carbolated compresses to the wound. Dr. Reichenbach was then called to the case, and he found a wound close to the edge of the ribs a little to the left of the mesial line, circular in outline, and about $2\frac{1}{2}$ inches in diameter, through which a dark red tumor protruded.

The child was then anæsthetized (by chloroform) and the projecting tumor examined, together with the wound through which it escaped. The wound on more careful examination proved to be about $2\frac{1}{2}$ inches long, and the projecting tumor was found to be a portion of the stomach, which, slipping through the edges of the wound, was firmly held. The stomach not only protruded, but was itself wounded, an incision the same length as the external wound being present, through which chyme had escaped. The stomach was then drawn slightly forward, so that the edges of the wound on its wall could be more easily sutured, and violent vomiting at once ensued. This lasted for some time, and during its continuance the edges of the wounds were kept in apposition so that none of the contents of the stomach escaped through it. As soon as vomiting ceased, five catgut sutures were introduced after the manner of intestinal suture.

The protruding parts were then carefully cleansed, and during this procedure the peritoneum was also discovered to be included in the abdominal wound. At this time the child began vomiting chyle tinged with blood, the ejecta having been previously pure chyle only. No assistant being at hand, Reichenbach did not attempt to close the peritoneal wound, but completed the operation by sutures of the abdominal wound, six silk stitches being introduced; external dressing of iodoform, gauze, and salicylic wadding was applied, and opium internally administered; absolute diet. The next day there was considerable abdominal swelling, especially in the region of the stomach; vomiting still continued. No pain or fever, but considerable thirst. The vomiting continued one day, and was followed by diarrhoea, which was succeeded shortly by constipation. Milk was first given on the fourth day. The external wound healed by first intention except at the lower angle, where it healed by granulation. The stitches were removed in six days.

In three weeks the child was able to leave her bed; her appetite was good, and she is now entirely well.

Excision of the Cæcum for Epithelioma; Death on the thirteenth day.

Dr. WALTER WHITEHEAD, in the *British Medical Journal* of January 24, 1885, reports a case of excision of the cæcum for epithelioma. The operation is believed to be the first performed for the excision of the cæcum, and as such is worthy of record.

The clinical features of the case undoubtedly pointed to a tumor of the colon in the vicinity of the cæcum; and most probably a rapidly growing epithelial new formation. The tumor being movable, it appeared reasonable and justifiable to attempt the excision of the whole disease. It was decided beforehand to make the incision along the outer border of the rectus muscle in preference to that for lumbar colotomy, as it was believed that it would allow greater facilities for dealing with any enlarged mesenteric glands which might be present, and be better adapted than a median incision for the establishment of an artificial anus. The prudence of this decision was confirmed during the operation, and in the subsequent progress of the case.

Operation.—Chloroform was administered. The surface of the abdomen was thoroughly cleansed and dried; a large mackintosh, with an aperture five by eight inches cut out of the centre, and the under-surface of the circumference of the aperture made adhesive with plaster, was fixed to the skin, so that the opening corresponded to parts that would be involved in the operation. The abdomen was opened in the ordinary manner, in the situation previously decided upon, and the tumor exposed. It was examined, and found to be situated in the ascending colon, rather than in the cæcum, although practically involved in the latter. It was deemed advisable to detach the tumor above the valve. A double cat-gut ligature was first passed through the mesentery, and round the upper part of the ascending colon, well above the tumor. The ligatures were firmly tied, and the bowel divided between them. The cut surfaces of the bowel were freely washed with carbolic lotion, until they were free from any trace of feces. A second double ligature was then passed round the ileum in the same manner, and the gut divided with similar precautions. A small aperture was then made in the upper layer of the mesentery, through which the fingers were passed, and the two layers of the mesentery separated. The superior layer was cautiously divided close to the bowel by the use of scissors. An indurated mesenteric gland, of the size of a split walnut, was then discovered some distance from the growth, whilst others somewhat smaller were found inseparable from the gut. Up to this

stage of the operation, no difficulties whatever had been met with. The removal of the gland being deemed essential to the ultimate success of the operation, a careful dissection was commenced. The gland had almost been cleared from its surroundings, when a sudden gush of dark blood took place, the origin of which it was impossible to determine at the moment. That it was from an unusually large vein there could be no doubt, and for a time the vena cava was suspected. Whilst pressure was maintained over the bleeding aperture, the tissues above and below were separated, and finally the superior mesenteric vein was fully exposed, and found distended to the size of a first finger. A catgut ligature was placed above and below the gland round the vein, and the intermediate part of the vein and the gland removed together. The other layer of the mesentery was then cut across without any bleeding, and the mass removed. The abdominal cavity was cleared of all the blood, which had amounted to very little throughout the operation, notwithstanding the accident to the vein. The ligature was then removed from the small bowel, and the gut stitched to the skin at the lower end of the incision, and, after removing the other ligature, the colon was secured to the skin at the upper portion of the wound. A very large number of silver sutures were employed for this purpose, and great pains were taken to leave no opening for the penetration of fecal matter into the deeper tissues. The remaining portion of the wound was next brought together by strong silver wire passed through skin, muscle, and peritoneum. The surface was dressed with iodoform.

The patient recovered quickly from the effects of the chloroform, and expressed himself as feeling very comfortable. During the first days succeeding the operation his condition was good, but the sixth day unfavorable symptoms were manifested. These persisted and gradually became more serious, and at the end of thirteen days the patient died.

The portion of intestine removed included the last two inches of the ileum, the cæcum with the vermiform appendage, and the greater part of the ascending colon. Its total length from the lower part of the cæcum to the cut end of the colon measured fourteen inches, whilst from the ileo-cæcal aperture to the cut end of the colon it measured nine and a half inches. About two inches beyond the junction of the ileum with the cæcum, an appearance of intussusception was observed, and in this region an enlarged and indurated lymphatic gland was firmly united to the intestinal wall. Corresponding in position to this attachment, the internal surface of the bowel presented a fairly defined circular area, about three inches in circumference, occupied by an irregular fungoid and ulcerated mass, which projected into the lumen of the gut. This involved only the inner part of the intestinal wall; the remaining part, as well as the rest of the intestine, presented a healthy-looking unbroken mucous lining, nor was there any other evidence of invasion of the wall with new growth beyond the area mentioned.

REMARKS.—In reviewing this case, there are several points of interest which appear worthy of brief comment.

The diagnosis was made without difficulty, which is unusual in cases of malignant disease originating in the colon, especially when, as most frequently occurs, the disease attacks the descending portion of the bowel. The protracted diarrhœa, the local character of the pain in the right lumbar region, the rapid growth of the tumor, the freedom with which it moved and always returned to the situation of the cæcum, and the quick emaciation of the patient, pointed with marked precision to the locality and nature of the growth.

Confident of the diagnosis, the steps of the operation could be deliberately designed, a rare advantage in operations involving the intestines. The first point to determine was the most suitable situation to open the abdomen. The reasons which influenced the choice in this instance may with equal force, it would appear,

be applied to all cases of malignant disease connected with any portion of the colon not extending beyond the sigmoid flexure.

The median incision affords more room for general exploratory purposes than any other, but it is ill adapted for the establishment of an artificial anus, and necessitates a second incision in the loin for that purpose. The lumbar opening is, undoubtedly, the one best adapted for an artificial anus; but, unfortunately, it gives no room for the removal of infiltrated mesenteric glands, should they exist. Mr. Bryant's preference for the lumbar incision, and the assertion that five or six inches of the gut can, with ease, be reached and examined, does not affect this all-important question in suspected malignant disease. An intermediate incision, made three inches from the linea alba, combines the double advantage—not so completely perhaps as could be desired, but, nevertheless, sufficiently to be accepted as a practical compromise between the two. In this case, at least, it confirmed the judgment which was exercised.

The second point to decide was whether or not, after removal of the growth, it was desirable to unite the divided ends of the bowel together. The desire to attempt the latter course was naturally great; but, the main object being kept strictly in view, it was not considered warrantable to subject the patient to such additional risk, especially in an operation which only holds a tentative position in surgery. Whilst admitting the wonderful success that has attended the operation of enterorrhaphy, it cannot at present be regarded as an established precedent free from objections and disadvantages. The danger of non-union, and the contingency, possibly remote, of future stricture, are risks which do not admit of being lightly passed over. Further, by bringing the two ends of the bowel outside, there always remained the opportunity, should it ever be considered desirable, of uniting them by a subsequent operation.¹

There is no object in subjecting a patient to an operation attended with the greatest risk, unless it be accompanied with a firm determination to remove the whole of the disease, if it be practicable and within the range of surgical art. If the object be simply to temporize and relieve pressing symptoms, such as those resulting from obstruction, colotomy will accomplish all that is desired, and with considerably less risk to life.

It is evident from the *post-mortem* examination that the man died from peritonitis, and that the peritonitis was of traumatic and not of septic origin, as the inflammatory indications were less intense as it receded from the incision. Each detail of the operation was practically successful. All the parts, with the exception of the skin, had completely united, and there had been no leakage of feces into the abdominal cavity.

In looking for satisfaction, after the termination of the case, one has to be content with the reflection that the patient did not die from the immediate effects of the operation, and to be consoled with the knowledge which the *post-mortem* examination affords—namely, that the whole of the disease had been removed, and the certainty that the patient must very soon have succumbed to a painful death had no attempt been made to cure him.

The operation was conducted upon strict antiseptic principles, and the abdominal cavity remained aseptic to the end. There was complete union of the peritoneum, and between the muscular walls of the abdomen. There had been

¹ Sir Spencer Wells, in his Inaugural Address on the Revival of Ovariectomy (*British Medical Journal*, 1884, November 15th, p. 950), states that, in a recent paper by Reichel, 121 cases of resection of intestine have been collected, the conclusion being that the two ends of the bowel should not be united at the time of resection, but that an artificial anus should be established.

no secondary hemorrhage, nor had there been any violent sickness. The temperature was even remarkable for its uniformity at or about the normal range.

Taking all the facts of the case into consideration, it is reasonable to suppose that, had the man possessed a less dilapidated constitution, and been more temperate in his habits, complete recovery might fairly have been anticipated.

Urethral Fistules of the Penis and their Treatment.

Dr. ROBERT, in the *Annales des Malad. des Organes Genito-Urin.* (Feb. 1885), after commenting upon cases of urethral fistulas of the penis which have come under his notice, remarks as follows upon their nature and treatment. Narrowing of the urethra is not a necessary complication of urethral fistulas resulting from strangulation of the penis, neither is it the most frequent cause of failure in its treatment.

Intractability of patients, extensive loss of tissue, disorganization of the skin surrounding the fistula are a far more serious hindrance to operative success. The use of the sound is always attended with inconvenience, and repeated catheterization, notwithstanding the difficulties attending it, is much more preferable.

Extended incision, according to the method of Ricord, and recently recommended by Clutton, offers first real advantages, but renders the operation more serious, and does not always prevent the passage of urine through the anterior wound. Vesical puncture, recommended by M. Tillaux, may be resorted to when catheterization is difficult.

Intraperitoneal Rupture of the Bladder.

At a recent meeting of the Berlin Medical Society, Dr. SONNENBURG exhibited a preparation showing an intraperitoneal rupture of the bladder. The patient, a healthy man, fell down stairs and was carried senseless to bed. On regaining consciousness he complained of strangury, and was unable to void his urine. On introducing the catheter, blood, and then urine, in great quantity, about two quarts, escaped. Herr Sonnenburg first saw the patient 24 hours after the injury; examination showed the abdomen to be painful under pressure, and suggillation was visible near the symphysis pubis. On the introduction of the catheter, clear urine passed, and, therefore, rupture of the bladder was not diagnosed. The pulse was something above 80, and the general symptoms favorable. However, after 24 hours great change was evident. The pulse was 140, and operation was decided upon. Incision was made in the linea alba. Upon opening the peritoneum, a quantity of fluid escaped which was partly composed of urine. The intestine was inflamed and showed the existence of incipient peritonitis. On the posterior wall of the bladder was a rent extending from the summit nearly to the neck. The condition of the patient was such that the use of chloroform was contraindicated, and suture of the bladder was impossible. Cleansing of the abdominal cavity was resorted to, and the attempt made to perfect the operation by drainage. The following day the pulse was scarcely perceptible and the extremities perfectly cold. Consciousness was perfect, however, and the patient was comfortable. Strangury had ceased and the urine escaped, in part through the abdominal opening, and in part normally. The third day the temperature was normal and the pulse perceptible, and a series of days succeeded in which the symptoms were favorable, and danger of peritonitis was no longer apprehended. On the fifth or sixth day symptoms of beginning urinary infiltration manifested themselves, and therewith beginning sepsis, from which the patient died on the eighth day. Autopsy showed that peritonitis no longer existed, but that the entire pelvis was infiltrated with urine.—*Deutsche Med. Wochenschr.*, Feb. 5, 1885.

Litholapaxy performed on a Tabetic Patient.

At a recent meeting of the Berlin Medical Society Dr. FÜRSTENHEIM reported a case of tabes in which litholapaxy was successfully performed. The patient was a man 58 years old, of good family history. Symptoms of tabes first manifested themselves about twelve years ago. Along with other symptoms of the disease, difficulty in voiding the urine was noticeable, and eventually urinating became impossible, and the catheter was habitually employed. Cystitis also was a complication of the disease, and this gradually became worse in spite of all treatment. Examination finally revealed the presence of a stone in the bladder. It was movable, of moderate size, and not hard. Lithotripsy was decided upon, and the operation was performed under chloroform. Much difficulty was experienced in grasping and crushing the stone, and the operation was left unfinished. Only a small portion of the stone was removed, but great improvement in the urinary symptoms followed, and urine passed spontaneously for several days, and along with it small fragments of the calculus. Improvement was only temporary, however, and blood finally appeared in the urine. A new operation was decided upon, and litholapaxy was selected as being most advisable. The patient preferred to undergo the operation without chloroform and endured the introduction of the instrument well, but efforts to grasp the stone gave him so much pain that he at last asked for the anæsthetic. The stone was now quickly grasped and crushed, and the bladder washed out. The instrument was introduced five times in all. Carbolyzed water was finally injected until it returned free from *débris*. No blood was lost during the operation.

No unfavorable symptoms were manifested, and the day succeeding the operation the patient was free from pain and fever, and the urine flowed spontaneously. Within a week, however, it again became necessary to resort to the catheter. The fragments of the stone weighed about 100 grains, and were composed principally of the phosphates and carbonate of lime, with traces of ammonio-magnesian phosphate and uric acid.—*Deutsche Med. Wochenschr.*, Jan. 29, 1885.

Simultaneous Double Distal Ligation of the Carotid and Subclavian Arteries for High Innominate Aneurism.

At a meeting of the Royal Medical and Chirurgical Society Mr. RICHARD BARWELL read a paper on Simultaneous Double Distal Ligation of the Carotid and Subclavian Arteries for high Innominate Aneurism. The patient, a female, aged forty-eight, was admitted into the Charing-Cross Hospital on February 16, 1884. She was thin, pale, and anæmic. Her health had been uninterruptedly good until eighteen months ago, when she had a fall, without immediate ill effects. A year ago she noticed a sense of throbbing at the upper part of the right side of the chest, and very soon afterwards neurotic pains and loss of power in the right arm. On admission the right half of the sternum, the two upper costal cartilages, with their interspaces, were protruding and pulsatile. In the outer half of the episternal notch, and behind the inner head of the right sternomastoid muscle, was a pulsatile tumor, which involved the carotid artery. The voice was very low and toneless. Very little air entered the lungs. The apex beat of the heart was not displaced. The right radial pulse was very small, and ceased altogether four days after admission, when no pulse could be felt throughout the arm nor at the third part of the subclavian artery. During the next twelve days the patient became more feeble, less air entered the chest, and the line of dulness rose higher.

On February 28th Mr. Barwell tied the carotid, and as the immediate effect of ligaturing this vessel was an increased pulsation of the sac, he tied the third

part of the subclavian also, lest the obstruction should yield and the aneurism again increase outward. The patient, though weak and disturbed by some intestinal troubles, went on well until March 28th, when recurrence of pulsation in the cervical part of the tumor took place; this continued for seventeen days, when it diminished and soon ceased altogether, and definite consolidation followed. On May 6th she left the hospital. On June 4th she showed herself at the institution; there was no enlargement at the upper part of the chest nor any tumor to be felt in the neck. Over the site of the late aneurism the percussion note was clear, and the respiratory murmur was distinct. No pulse could be felt in any branch of the right carotid and subclavian arteries.

Mr. Barwell believed the symptoms clearly indicated a high innominate aneurism involving both the artery and its bifurcation, because pain in the right arm was a very early symptom. It was probable that the disease first began in the subclavian branch, and that the subsequent affection of the inner side of the innominate compressed the subclavian and that portion of the sac arising from the subclavian artery. Anatomical reasons were given for this view, and attention was directed to the absence of tumor at the clavicular part of the sternomastoid muscle. In his remarks the author dwelt upon the spontaneous cessation of the pulse in the right arm, and stated the means he had taken to ascertain whether cerebral injury would follow ligature of the carotid artery in this case. No cerebral symptoms were caused by the deligation, although probably no blood found its way directly to the right side of the brain. He also drew attention to the return of the lungs to the normal state. Questions were propounded as to the mode in which soft clots in aneurismal sacs were disposed of when recurrence of pulsation occurs.

This case was the sixth instance of double distal deligation that Mr. Barwell had brought before the Society. Of these five had been successful, the one narrated to the date of last seeing the patient (August, 1884) perfectly so. He said Mr. Mitchell Banks had brought from Liverpool a specimen of ligature of the innominate artery.

THE PRESIDENT inquired as to the causation of the aphonia. He said the loud ringing brassy cough which so frequently accompanied aneurism of the aorta was almost sufficient for the diagnosis of the disease.

Mr. MITCHELL BANKS had performed the operation of simultaneous double distal ligature on a soldier for innominate aneurism rising high in the neck. He ligatured both the carotid and subclavian vessels with kangaroo tendon ligatures. The patient did well till the thirteenth day, when there appeared a fulness and swelling, which steadily increased, and were found to be due to extensive effusion of blood. Death followed in about a month, and then it was found that the aneurism had been nearly occluded by laminated clot. The subclavian artery at the point of ligature was completely destroyed, and this explained the concealed hemorrhage. The question must still be considered open as to what was the best material for ligaturing the great vessels. Kangaroo tendon, which was first used by Girdlestone, seems to be absorbed too readily; he had not yet used ligatures made from the aorta of the ox. Nearly all the cases of ligature of the large arteries about the region in question died from secondary hemorrhage, and a most serious question was the material to be used as a ligature.

Mr. TIMOTHY HOLMES said that he had been, and still remains, at issue with Mr. Barwell as to the best method of treatment. He believed that the best method was not simultaneous ligature of the carotid and subclavian arteries, but ligature of the carotid artery alone, and, if necessary, subsequent ligature of the subclavian artery. The most successful case on record was the old one of Evans, performed in 1828, in which the patient lived for nearly forty years after the

ligature of the carotid artery, and then died from some unknown cause. This case was strikingly like that described by Mr. Barwell. Occasionally a similar result followed ligature of the left carotid for aneurism lower down; in one such case of aneurism of the transverse part of the arch of the aorta in a young woman an excellent result followed. The first case reported in Mr. Beaney's pamphlet had undergone very definite improvement after the application of the ligature to the carotid artery, and the reason for the subsequent ligature of the subelavian artery in this case was not evident. The lives of these patients were precarious, and it was important to recognize that ligature of the subelavian added greatly to the risk of a fatal result. Where the stress of the aneurism fell chiefly on the subelavian part of the sac, it might be proper to deligate that vessel first, but as a rule ligature of the carotid artery produced more effect, for it gave off no such considerable branches as does the subelavian in the first two parts of the course. Ligature of the carotid artery completely arrested the current of blood. He considered the ox-aorta ligature a very much better ligature than catgut prepared in any way; the kangaroo tendon also formed an admirable ligature, and the failures with it were probably owing to not pulling the ligatures sufficiently tight.

Mr. HOWARD MARSH congratulated Mr. Barwell on the success of his remarkable group of cases. He thought the discussion of the treatment of aortic and of innominate aneurisms ought to be kept apart. In Mr. Barwell's present case it should be borne in mind that the pulsation of the subelavian artery had ceased before the ligature was applied to that vessel. He considered that closure of the carotid and subelavian arteries at the same time was really not often effected; in another alleged case, for instance, the carotid was all but occluded at the time of the operation. It should be remembered that rapid dilatation of the arch of the aorta followed ligature of the subelavian artery. He agreed with most of Mr. Holmes's remarks on the value of ligature of the carotid alone. In one case Mr. Barwell had ligatured the carotid so loosely that the lumen of the vessel was still patent, and the first and second parts of the subelavian were still open. Reference was made to one of Mr. Heath's cases in which the aneurism affected the ascending part of the arch of the aorta, and which was greatly benefited by distal ligature of the carotid artery. He considered that the way in which these operations take effect in different cases was not sufficiently recognized. With regard to the kangaroo ligature, he had reason to be satisfied with it on the whole, though in the hands of Mr. Willett and of himself the ligature had broken on more than one occasion. In the sixty-sixth volume of the *Royal Medical and Chirurgical Transactions* an account of a case operated on by him is recorded.

Mr. SPENCER WATSON had used kangaroo tendon and ox-aorta ligatures, and did not think it necessary to cut through the inner and middle coats of the artery, but merely to bring the sides into apposition.

Mr. Barwell, in reply, reviewed the cases which Mr. Banks and Mr. Heath had recorded. The weakly state of the patients would rather make one perform the double ligature at one operation than expose the patient to the risks of a second operation later on. Were it not for the danger of the operation, he would rather ligature the first part of the artery, in order to cut off as much blood as possible from the aneurism.—*Lancet*, Jan. 31, 1885.

The Removal of the Marrow of Long Bones and the Application of Corrosive Sublimate Solution and Iodoform, as a Treatment of Osteomyelitis.

Dr. CHAS. B. KEETLEY, in an interesting article on this subject, gives the results of his experience with the operation. In three cases cited, the removal of the marrow of the bones had no bad effect—either in reducing their vitality or

in preventing union. In two cases of fracture, one of which occurred during operation, owing to the presence of numerous cloacæ in the bone, sinuses were also present, and the fracture was therefore compound. The solution of corrosive sublimate was used in the proportion of 1 to 960. The iodoform was used in the form of the concentrated ethereal solution. The shaft of the bone was in each case thoroughly disinfected with both the iodoform and mercury solutions. In addition to his own cases, Dr. Keetley cites those of Bleekwenn, Stoll, and Petrowski, all of whom have used the same procedure with like good results. Stoll and Petrowski, moreover, have filled the cavities of the bones operated upon with iodoform, with uniformly favorable results. Petrowski recommends the treatment in gunshot wounds as a prophylactic against osteomyelitis, so frequent and fatal when long bones are hit. Dr. Keetley considers it now demonstrated that the medullary cavity of a long bone can be opened, scraped out, drained, and treated locally by powerful germicide drugs, and that the operation is followed by little or no pain or constitutional reaction or danger to the life of the bone—but, on the contrary, by good results.

In conclusion, the following practical observations are made:—

1. In the face of Shede's operation, as to the dangers of using iodoform too freely, and on the occasional existence of idiosyncrasy with regard to that drug, the writer would hesitate to imitate surgeons who fill the medullary cavity with it. Moreover, personal experience shows it is superfluous to do so.

2. If the shaft of a long bone cannot be thoroughly scraped out through a lateral hole, the bone may be completely divided, and yet a speedy and thorough union reckoned on. The experiments of Maas on animals proved how unnecessary is the preservation of the medulla in order to secure union of fractures. The writer's personal experience shows that the same law applies to the human subject.—*Annals of Surgery*, Jan. 1885.

OPHTHALMOLOGY AND OTOLOGY.

Ocular Affections in Locomotor Ataxia.

M. GALEZOWSKI, in *La Recueil d'Ophthalmologie* (May, June, and July, 1884), gives a clear and methodical *résumé* of the various ocular disturbances which are met in locomotor ataxia.

These affections may be manifested upon the optic nerve, upon the motor muscles, or upon the trifacial.

The alterations of the optic nerve are especially interesting from the time of their first appearance, inasmuch as they are easily confounded with the changes due to toxic amblyopia.

In locomotor ataxia visual acuteness is nearly always unequal in the two eyes. Patients may be unable longer to see green and red. On the other hand, reading at short distance is possible for a long time, while acuity of vision for distant objects is much diminished. Finally, as has been shown by M. Darier, a much stronger electric current is required to produce manifestations of light in the beginning of ataxia than in toxic amblyopia.

In the branches of the fifth pair which border upon the eye, anæsthesia, and sometimes hyperæsthesia, are observed.

The spots where anæsthesia is present rarely are acknowledged by the patient, but to be discovered must be sought for with care. Sometimes patients com-

plain of a feeling of heaviness in the peri-orbital region and in the face, can no longer feel the contraction of the muscles of this region, and frequently use the hand to assist the motion of the part.

Hyperæsthesia is manifested by neuralgia, or by lancinating pains similar to those experienced in the lower limbs. Excavation of the optic papillæ, which resembles the changes due to glaucoma, accompanies these manifestations of pain.

These diverse affections have hitherto resisted treatment, but Galezowski, agreeing with Fournier as to the commonly syphilitic origin of the disease, advises at the beginning of the attack vigorous anti-syphilitic treatment. He advises hypodermic injections of 5 or 6 drops of a solution of cyanide of mercury of $1\frac{1}{2}$ grs. to 5 drachms of distilled water. At a more advanced period, when the organism is saturated with mercury, he employs hypodermic injections of cyanide of gold and potassium, which, in some cases, have given marked success; but in others they have totally failed.—*Gazette Médicale de Paris*, December 27, 1884.

Amaurosis due to Anæsthesia of the Optic Nerve.

M. DIANOUX, in the *Bulletin de la Société Française d'Ophthalmologie*, makes some interesting observations upon this not very rare variety of blindness, though few cases have hitherto been published. The symptoms are briefly these: abrupt beginning, generally during sleep or subsequent to some violent emotion, and ushered in by a feeling of weight in the fronto-parietal region. Blindness is at first absolute, and the patient cannot distinguish night from day. The blindness attacks almost indifferently the right or left eye, in contrast to what takes place in hysterical amaurosis, which is habitually connected with hemi-anæsthesia. It usually is mono-lateral, but may affect both eyes. Once developed, it lasts indefinitely. Examination of the eye gives entirely negative results, and the ophthalmoscope reveals no indications of disease. Without any treatment, the affection may have three different conclusions: it may either be cured spontaneously, persist a long time without change, or the optic nerve gradually may pass into a condition of atrophy.

Diagnosis of anæsthesia of the optic nerve is easy; the absence of every ophthalmoscopic lesion enables all affections of the fundus of the eye to be excluded. Amblyopia due to alcoholic or nicotine poisoning never causes such extensive perversion of vision without sign of atrophy, and amauroses of cerebral origin are always accompanied by hemiplegia or hemi-anæsthesia. The prognosis of this variety of blindness is in most cases favorable, with certain reserve, however, as the graver changes sometimes occur. Moreover, treatment is important as a criterion, since in favorable cases amelioration is almost immediate.

The treatment consists in the use of cod-liver oil, iron, and quinine in appropriate doses. Uterine disturbances should be inquired after, and carefully treated. Locally strong injections of strychnia should be used; $\frac{1}{15}$ grain injected into the temple. The continued galvanic current gives the best results of all electric applications, the positive electrode being placed behind the mastoid protuberance, and the negative applied to the closed eyelids.—*L'Abeille Médicale*, Jan. 5, 1885.

Hypodermic Injection of Pilocarpin in Affections of the Labyrinth.

Prof. ADAM POLITZER, at a late meeting of the Medical Society of Vienna, recommended, as the result of several years' experience, the subcutaneous injection of the muriate of pilocarpin in the treatment of deafness due to disease of the labyrinth, in order to promote the absorption of the exudation which may be in the labyrinth through the rapid tissue change which the drug produces.

Gradually increasing doses of 2, 3, 4, 5, 6 drops of a two per cent. solution were injected daily into the forearm. Extreme symptoms of salivation and perspiration, and the incipient symptoms of severe vomiting, were quickly allayed by two drops of a solution of atropiæ sulph. in water (gr. ss to Ziiss water). The number of injections varied from six to forty.

The favorable results in the treatment of syphilis of the labyrinth have already been reported. In eleven cases, five of recent origin improved and six received no benefit. In one case, the distance at which loud speech could be heard was increased from zero to sixteen and one-half feet. In a second case, in which loud speech could be distinguished only at a distance of thirteen inches, the hearing improved until whispering could be distinguished at a distance of nearly twenty-three feet.

Prof. Politzer also cites a case in which non-syphilitic disease of the ear was much benefited by the use of pilocarpin. The patient was deaf in the left ear for two years, and in the right completely deaf for nine months; after seventeen injections rapid improvement began, and at the end of the third week the hearing, with the exception of acoustic hyperæsthesia, was nearly normal. Unfavorable results obtain in the use of pilocarpin in pan-otitis, cotemporaneous inflammation of the middle and internal ear.

Other specialists have used pilocarpin on the recommendation of Prof. Politzer. Prof. Lucas, of Berlin, in thirty-five cases obtained remarkable results in five, slight benefit in six, and in twenty-four no improvement. Profs. Moos and Wolf, in two cases of middle ear disease due to scarlatino-diphtheria, in which there was total deafness, observed the restoration of hearing after a long use of weak pilocarpin injections.—*Allgemeine Wien. Med. Zeitung.*, Jan. 20, 1885.

Exfoliation of the Cochlea without Loss of Hearing.

The loss of the cochlea, according to the ingenious researches of Helmholtz, is considered to be equivalent to the loss of hearing power. A case, however, which Professor Grüber demonstrated on Dec. 12th, at the meeting of the Society of Physicians in Vienna, would seem to go far towards refuting this view. The case occurred in a lad, aged fourteen, who had been ailing for four years, and who was admitted into Professor Grüber's wards last November. It was stated that the patient suffered from an old otorrhœa with polypus of the left ear. As the patient experienced great pain, and as paralysis of the left facial nerve existed, Professor Grüber had no hesitation in entirely removing the polypus, and in doing so came upon the cochlea in a state of necrosis. Since the operation the patient has felt better, his pains have ceased, and the paralysis of the facial nerve has nearly disappeared; but, strange to say, the lad's affected ear has regained the power, not only of recognizing sounds, but of distinguishing musical notes. Only two similar cases seem to have been recorded. One was observed by Dr. Cassols, at Glasgow, the other by Dr. Christinneek, in the clinic of Prof. Schwarze at Halle. Prof. Grüber did not enlarge on the features of this interesting case; but it certainly affords food for suggestive thought in reference to treatment of diseases of the ear. Heretofore, the labyrinth was considered a sort of *noli me tangere*; but now we see that the entire cochlea may be missing, and yet the aural powers be retained. On the other hand, it is not yet quite certain whether in the above case paralysis of the auditory nerve may not eventually occur.—*Lancet*, Jan. 3, 1885.

Treatment of Deaf-mutism caused by Auricular Compression.

Dr. BOUCHERON, at the conclusion of a valuable paper upon deaf-mutism, caused by auricular compression, reaches the following conclusions relative to the treatment of the affection:

The compression of the acoustic nerves has its origin in the vacuum existing in the tympanum, caused by the absorption of the air by the vessels of the ear cavity.¹

The vacuum is rapidly reproduced when the air cannot easily be renewed.

The first indication is to abolish the tympanic vacuum as often as it is reproduced.

When the vacuum in the cavity persists for some time the atmospheric pressure depresses the tympanic membrane, drives down the ossicles, and fixes them in a vicious position.

This gives rise to inflammation of the mucous membrane, causing thickening and the production of new connective tissue. The newly-formed elements become organized and retract, and the retraction tends still further to immobilize the stapes and other ossicles in their mal-position.

Therefore, *this position may persist after the disappearance of the tympanic vacuum*, and the effects of the auricular pressure outlast its original cause.

The second indication is to return, by means of pressure without the tympanic membrane, the ossicles, and especially the stapes, to their correct position, and to mobilize them as much as possible.

The affection which causes most frequently a vacuum of the tympanic cavity is obstruction of the Eustachian tube, by an auriculo-tubal catarrh, which is either accidental, constitutional, or hereditary.

The third indication is to cure such catarrh and to resort to proper treatment when it is of constitutional origin.

The fourth indication is to stimulate the labyrinthian nerves, anæsthetized by compression.

The fifth indication is to educate the sense of hearing, if ability to distinguish speech remain.

The sixth indication is to instruct by artificial methods if hearing is partial, insufficient, or wanting.

The treatment of the condition above described varies. The first and second indications are fulfilled by insufflations of air into the tympanum by catheterization. Young children should be anæsthetized preparatory to undergoing this operation. Dr. Boucheron employs the method of Saint Germain, which requires but five or six inspirations of chloroform. Its results are uniformly pleasant and safe.

Perforation of the tympanic membrane and section of the muscles of the malleus are also employed when required by the preceding indications.

Politzer's bag is employed after such operation when the ossicles and membrane have resumed their proper position, in order to maintain the correction. Its use is also advisable in new-born children, in families of deaf-mutes, when naso-pharyngeal catarrh with auricular complications is to be feared.

Naso-pharyngeal catarrh should be treated by astringents or by general medication according to the symptoms and the diathesis of the patient.

When the Eustachian tubes are open and the nerves compressed, the feeble continued current may be employed.

Early instruction in speech, either by the aid of hearing when the voice can be perceived or by artificial methods, when the sense of hearing is lost, is important.

—*Revue Mens. de Laryngol. d'Otol. et de Rhinol.*, Feb. 1885.

¹ The rapidity with which air introduced beneath the skin by the hypodermic syringe is absorbed, is well known, and the absorption of the air in the tympanic cavity is accomplished in the same manner by the same physiological laws.

MIDWIFERY AND GYNÆCOLOGY.

Corrosive Sublimate in Obstetrics.

Two cases of mortal poisoning by uterine injections of Von Swieten's fluid are actually known to have occurred. They are reported by Drs. STADTFELDT and STENGER. They are perhaps debatable, but should lead the accoucheur to use corrosive sublimate only with certain precautions, and with a knowledge of the reason therefor. This reserve made, corrosive sublimate nevertheless remains the best antiseptic in obstetrics. The statistics furnished by the different maternities of Paris, and particularly by those in the service of Prof. Tarnier, where the agent has been employed for the first time, are sufficient evidence on this point. Hofmeier reports the cases above referred to in the *American Journal of Obstetrics* for September, 1884. The first case was that of a primipara, æt. 25, who had been long in labor, and showed some symptoms of fever during the delivery. The soft parts were very unyielding, requiring some slight incisions, and the patient was delivered with forceps. There being some atony, hot injections of corrosive sublimate, 1 : 1000, were given. During the first days of the puerperium the patient presented some very peculiar symptoms: general depression, then a comatose state, together with a certain hyperæsthesia of the whole body, subnormal temperature, and offensive diarrhœa. About the fourth or fifth day these symptoms abated. The patient had some puerperal abscesses, for which she continued under treatment for some time at her house. Albumen was present in her urine a considerable time from the first day on.

The second case was that of an eclamptic primipara, æt. 25; the eclampsia on the whole ran a benign course; the patient was delivered by the forceps without material difficulty. After delivery there was some degree of uterine atony, for which a hot irrigation with about six pints of a 1 : 1000 corrosive sublimate solution was given. The hemorrhage ceased, and the patient soon recovered consciousness. On the days succeeding delivery there appeared great hyperæsthesia, subnormal temperature, and profuse fetid diarrhœa. The patient became somewhat somnolent, and death ensued on the fourth day. The autopsy again showed the most extraordinary alterations in the intestinal mucosa, which was enormously swollen and partly gangrenous as far as the transition into the ileum, but especially so in the rectum. The kidneys showed marked deposits, although calcareous deposits, as in Stadtfeldt's case, could not be found. From these cases Hofmeier concludes that the condition of the kidneys has much to do with the poisonous effect of the sublimate. The conclusions seem entirely justifiable when it is remembered that these organs play a very important part in the excretion of many toxic drugs. For example: opium and its derivatives are contraindicated, or should be administered with great caution, in cases of nephritis. In 1873 Bouchard published two cases of mercurial poisoning terminating in death in two patients: one a case of interstitial, the other of parenchymatous nephritis. Only small doses of the drug were taken. It therefore seems established that slight renal disease entails great caution in the use of corrosive sublimate, and that in extended degeneration of the organs its use is altogether contraindicated.—*L'Union Médicale*, Jan. 6, 1885.

A Successful Case of Laparo-Elytrotomy.

In the *Annals of Surgery* for Jan. 1885, Dr. ALEX. J. C. SKENE reports a case of laparo-elytrotomy which is the ninth on record, and the fourth on which Dr. Skene has operated; three of his four operations having been successful. The patient was twenty-one years of age, and when a child was the subject of

rickets. She was a patient of Dr. L. S. Pileher, who, upon examination, found the antero-posterior diameter of the superior strait to be as he supposed less than two inches.

Dr. Skene having been called in consultation, an operation was decided upon, and laparo-elytrotomy was selected as being preferable to craniotomy. The usual incision was made in the left groin, in which the internal epigastric artery was divided, but, being secured by a Péan forceps, caused no further trouble. In incising the wall of the vagina a minute opening was made into the bladder. There was some difficulty in effecting complete dilatation of the uterus, but this at length being accomplished, a living male child, fully developed and weighing seven pounds, was delivered by version through the wound in the groin. The placenta was likewise delivered.

The wound in the groin was closed by carbolized silver sutures, and a soft rubber draining tube carried from the inner angle of the incision downward through the incision and out of the vaginal entrance. No attention was paid to the tear in the bladder, but a self-retaining catheter was inserted into the bladder. The case progressed favorably; the temperature rising above 100° F. but once (on the second day) on account of imperfect drainage. On the fourth day there was the ordinary mild fever, during which the temperature rose to 100.25° for one day. On the twenty-first day after the operation the catheter was removed, and the patient allowed to sit up. Vesical irritability at this time necessitated micturition every two hours. In two weeks the urine could be retained about three hours.

Concerning the operation Dr. Skene remarks, that before beginning it sufficient dilatation of the cervix is important; that there is no great danger from hemorrhage; and that in the four cases operated on by him it has not been necessary to ligate a single vessel; and that the loss of blood has not been greater than that in normal labor. He further observes that great care is necessary to avoid injuring the bladder, though this accident when it occurs is trifling, as is proven in this case by the wounds having healed without the introduction of sutures.

Prophylaxis of Post-partum Hemorrhage.

Dr. GLYNN WHITTLE, after discussing the treatment of post-partum hemorrhages, makes the following suggestions as to the prophylaxis of this so serious accident of child-bed:—

In these cases of apprehended hemorrhage, while it is important to follow down the uterus with the hand, we should nevertheless be in no hurry to get the placenta expelled, but wait a quarter of an hour or twenty minutes to give the uterus time to recover from the strong efforts required to expel the child. But should flooding commence, it will of course be necessary to remove the placenta. Well-directed and careful manipulation of the uterus from the moment of the child's birth contributes much to the prevention of hemorrhage, and is a precaution of not less importance than the administration of ergot before the expulsion of the fœtus.

As a deficiency in the coagulating power of the blood is a predisposing cause of post-partum hemorrhage, astringent medicines should be administered for some time previous to the delivery of anæmic women. Gallic acid and sulphate of zinc have been recommended for this purpose, but I believe that the remedy on which most reliance may be placed is the tincture of perchloride of iron.

Notwithstanding what differences of opinion in matters of detail may exist, the conclusions of writers on this subject agree on all the main points, which may be thus summed up:—

First. That post-partum hemorrhage has certain premonitory symptoms, and that these symptoms are to be found in the characteristic pains, and in the condition of the circulation and the blood.

Secondly. That flooding can be averted by appropriate prophylactic measures, the preventive treatment, consisting of rupturing the membranes, administering ergot of rye, extracting the fœtus slowly, and following down the uterus with the hand.—*Liverpool Medico-Chirurgical Journal*, Jan. 1885.

Treatment of the Umbilicus in the New-born.

CREDÉ and WEBER, in the *Archiv für Gynækologie*, Band xxiii. Heft 1, give directions for the management of the umbilicus in the new-born.

1. It is preferable to wait four or five minutes before applying a ligature to the cord. If the ligature is immediately applied, a certain quantity of blood is diverted from the child's circulation.

The best method of ligature is with caoutchouc (small drainage-tubes), first suggested by Budin. Hitherto, fillets of thread were employed at the Leipsic clinic, and scarcely a week passed in which consecutive hemorrhage did not occur. Since the first of July, 1883, caoutchouc tubes have been employed, and not a single case of hemorrhage has occurred. A single turn of the rubber tube generally suffices to obviate all danger of hemorrhage, and two turns render hemorrhage absolutely impossible.

The rubber ligature also has the advantage of being able to be applied very close to the abdomen, thus diminishing the length of cord to be eliminated.

2. A little wadding held in place by the umbilical bandage is sufficient dressing for the cord. The wadding should be renewed each morning after the bath, which has no bad effect upon the rapid shrivelling of the cord. Wadding as a dressing for the cord has the advantage over all other applications, that it filters the air, and thus debars the entrance of putrefactive germs, and should be continued till cicatrization is complete. Since the introduction of this dressing at Leipsic, many years ago, affections of the cord have been almost unknown.

A Case of Hysterectomy.

At a recent meeting of the Société de Chirurgie de Paris, M. TERRIER reported an operation of hysterectomy which he lately performed. The patient for twelve years had suffered crises of pain, comparable with those of child-birth, occurring either during the menstrual period or the interval between them. The tumor was first perceived six years ago; grew rapidly, and caused severe pain. Reduced by suffering, the woman twice entered the Hôpital St. Louis, and once a church hospital with the intention of undergoing an operation, which, however, was not performed.

When M. Terrier first saw the patient her condition was as follows: The belly very voluminous, being about forty-six inches in circumference at the level of the umbilicus, asymmetrical, filled by an enormous lobulated tumor, which extended downward as far as the utero-rectal cul-de-sac. The uterus had ascended behind the pubes, drawn to some extent upward and forward by the tumor. The general condition of the patient was good, but constipation frequently existed, and the urinary function was somewhat interfered with, being at times natural and again difficult and irregular. Exploratory puncture evacuated about eleven pints of a reddish-black color, containing the elements of blood. Diagnosis was made of fibro-cystic tumor of the uterus.

Operation was difficult, owing to the size of the mass, its adhesion to the anterior wall of the abdomen, to the epiploön, and to the peritoneum, and also to adhe-

sions with the ascending colon and the small intestine. Isolation of the tumor was effected with difficulty, it being necessary to form a pedicle with the uterus hypertrophied. M. Terrier at this juncture resorted to a classic proceeding, viz., the introduction of two large trocars, to supply the place of needles, and the application of two iron-wire handles joined by Ciotrat's apparatus. A point in the operation, worthy of special attention, was the fear that the right ureter had been included in the wire ligatures, and the precaution was taken to isolate the vessels supposed to contain the ureter, and to bring them out through the abdominal wound, so that the urine might easily flow out, and the performance of a subsequent nephrotomy was avoided. Happily, however, as examination afterwards showed, a hypertrophied Fallopian tube was only involved. As was thought, the tumor was fibro-cystic, weighing about 97 pounds, and in addition containing nearly seven pints of fluid. The immediate results of the operation were uncomplicated during the first fifteen days. All the sutures, needles, etc., were removed the twelfth day, and the temperature was below 100.4° F. The fifteenth day febrile symptoms appeared, and the twenty-first day the thermometer reached 104° F. Abdominal pains appeared, and shortly a discharge composed of urine and considerable pus flowed from the pedicle. Later diarrhœa and vomiting appeared. A little more than a month after the operation the local and general symptoms were improved; nevertheless there appeared at the level of the wound shreds or rather dark-colored soft masses, formed by gangrenous cellular tissue, and filled with white globules, masses which were gradually eliminated by purulent secretion. The origin of the sphacelous masses was difficult to determine; nevertheless, it appeared probable that they originated in the perivesical cellular tissue, perhaps even in portions of the bladder.

Towards the end of 1883 the patient had so far improved as to be able to sit up. Relapse, however, occurred in January, 1884, fever again appearing, complicated with epigastric pain and vomiting. These symptoms improved on the occurrence of abundant suppuration of the pedicle, but again in February suddenly reappeared, and in the right side, in the region of the kidney, a large and painful swelling was discovered, which was evidently the cause of the febrile manifestations. The cautery was twice applied over the swelling, but without effect. Moreover, the tumor in the side appeared to communicate with the wound of the pedicle, and from compression caused the exit of pus in great quantities therefrom. After several attempts a bougie was introduced into the fistula, and afterwards a probe of red caoutchouc, from 5 to 10 inches in length, and injections were made into the perirenal region. From this time the temperature fell to 98.6° F. Twice in April, however, it rose to 104° F., but at these times the probe had been removed, and improperly introduced. After the introduction of the probe the cauterized spots were allowed to heal, and antiseptic injections, at first of corrosive sublimate (1 to 1000), and afterwards of chloral (1 to 100) were made. Finally, the injections having become painful they were omitted, and the probe itself daily cleansed in an antiseptic solution of chloral. The patient still retains the probe, though but little pus issues from the fistula, and her health is excellent. How long the probe shall be used is a point undecided by experience; but M. Ferrier gives as his opinion that its use should be continued so long as tolerated by the tissues.—*Archives de Tocologie*, Jan. 1885.

Extirpation of the Uterus.

At a recent meeting of the Obstetrical Society of London, Dr. W. A. DUNCAN read a paper on Extirpation of the Uterus. The author, having had two cases of vaginal extirpation, proposes to give details of them, and then to discuss the whole subject of extirpation in its various aspects.

CASE 1.—The patient, aged thirty-seven, married, one child eleven years old, was admitted to the Royal Hospital for Women and Children on December 11, 1883, with a slight attack of pelvic cellulitis. When seen a few days previously, there was found a small growth of epithelioma on the portio vaginalis near the os uteri, and only involving the anterior tip of the cervix. The attack of cellulitis passed away gradually, and on January 22, 1884, extirpation was performed per vaginam according to Schroeder's method; great difficulty was experienced in ligating the broad ligaments, which were shortened from the inflammatory thickening left; the double drainage tube was inserted, and iodoform plugs in the vagina. The patient made an uninterrupted recovery, and was discharged cured on the thirty-ninth day, with an arched cicatrix in the vagina, but no induration whatever. She was readmitted on June 14th (five months after operation) with cough, pain over the lower ribs on the right side, night-sweats, and pyrexia. On the 25th an indurated mass was felt on vaginal examination above its roof; pelvic glands enlarged. The patient continued in much the same state, with intermittent pyrexia, the temperature remaining, as a rule, between 100° and 105°; she was discharged, at her own request, on July 16th, and died at home on November 1st.

CASE 2.—Mrs. P., aged fifty-four, admitted on February 4th, 1884, with ulcerating epithelium of cervix. Married thirty-two years, eight children. Quite well from menopause (ten years ago) until eight months before admission, when hemorrhage followed coitus. Vaginal extirpation on February 26th, as in Case 1. Collapse set in as soon as the peritoneal cavity was opened, and death took place twelve hours after operation.

The author, having discussed the advantages and disadvantages of the abdominal and vaginal methods, gave statistics of all the cases he could find, showing that after 137 abdominal extirpations there were 38 recoveries and 99 deaths, being a death-rate of 72 per cent.; whilst after 276 vaginal extirpations there were 197 recoveries and 79 deaths, being a death-rate of 28.6 per cent. The details of the after-treatment were then discussed, the author being of opinion that there was no necessity either to sew up the wound in the vagina, to put in a drainage-tube, or to plug the vagina; but he insisted on the importance of the free use of iodoform locally, of the upright posture for the first ten days, and of the free administration of opium. He next reviewed the various malignant and non-malignant diseases for which the operation has been done, and was of opinion that in none of the latter was it ever justifiable; that in sarcoma and carcinoma of the body of the womb and mucous membrane of the cervical canal it was indicated; whereas in cancer of the portio vaginalis, for which it has frequently been performed, the death-rate is four times greater than after supra-vaginal amputation of the cervix, and the ultimate results are almost precisely alike (32 per cent. being free from recurrence two years later). Hence in these cases he argues that we are not justified in performing it.

Dr. BRAXTON HICKS offered a word of caution in regard to accepting the evidence of the curette in cases occurring in the child-bearing period of life, since the mucous membrane of the uterus under the influence of pregnancy and other stimulants presents an appearance much like that of malignant disease. Again, sarcomatous polypi which may return, and ultimately cease, cannot be distinguished by the microscope from truly malignant growths.

Dr. JOHN WILLIAMS thought our knowledge of the operation was sufficient to enable us to form a judgment, at least as regards the vaginal and abdominal methods. The abdominal method is far the more fatal (72 per cent.), and is as likely to be followed by recurrence as the other; it has therefore practically been discarded. After the vaginal method the mortality is from 25 to 34 per

cent. ; the author estimated it at 28 per cent., which is little above the mortality of ovariectomy for many years after it had become a recognized operation, and this mortality might be considerably reduced. But the two operations are very different. If the patient recovers from ovariectomy, she is restored to health and strength, and so remains. After extirpation of the uterus for cancer, however, the disease recurs in a large number of cases within six months, while very few remain free after two years, and only one has remained free for five years. Again, most of these cases are those of cancer of the cervix, and not of the body, and supra-vaginal amputation gives better results than extirpation. This clearly limits the operation to cancer of the body. The diagnosis of this, however, presents difficulties. Dr. Williams has done the operation four times, and the only patient who recovered from it died a month later of fecal fistula high up in the small intestine. The patient had been examined under ether, and the uterus was found freely movable, very slightly enlarged, and no growth could be discovered in the pelvis, nor any adhesions between the uterus and surrounding organs ; but at the operation a soft adhesion was found between the fundus and a coil of intestine. The disease had passed through the uterine wall to the small intestine, and three or four days after the operation liquid feces passed by the vagina. Here the most careful examination failed to discover the extension of the disease beyond the uterus. Again, before a just opinion of extirpation can be formed the course and history of cancer of the body must be better known. This disease is far commoner than was formerly supposed, and its course is longer than was believed. In the early stages of cancer the pain is not severe, but becomes so after the disease has invaded the deeper tissues. Now, when recurrence takes place after operation, the disease is placed at an enormous advantage ; it recurs at the edge of the cicatrix, and at once attacks the deeper tissues, being associated with the severe suffering of an advanced stage of cancer. This means that after the operation the patient has a few weeks or months of comfort and supposed freedom from disease ; and then the disease returns and occupies the position it would have occupied, after months of comparatively little suffering, had it followed its course unmolested, for the tissues through which it would have had to make its way had been removed by the surgeon's knife.

Mr. THORNTON expressed his agreement with the conclusions of Dr. W. Duncan, and also with the remarks of Dr. Williams. He was not an opponent of operations for cancer ; in the case of the breast it is possible to remove the whole disease and all suspicious glands. The surroundings of the uterus, however, were very favorable for the spread of cancer beyond the possibility of complete removal. He thought the attack of cellulitis in Dr. Duncan's case was very likely due to displacement of cancerous elements during examination, and might account for the rapid recurrence after an apparently successful operation. Here he must express his dissent from the author ; he believed the practice of curetting cancer of the uterus to be very dangerous and apt to spread the disease. He had thought that the one possible indication for the operation was severe pain, but after Dr. Williams's remarks he was inclined to alter his opinion. Cancer of the body is slow in growth, and he thought it was rarely painful as long as it was confined to the body. The fetor of the discharge might be controlled by insufflation of iodoform. In cancer of the cervix extirpation was inferior to amputation of the cervix and the application of chloride of zinc. He preferred this method to all others on account of the power which chloride of zinc appeared to possess of following up the cancer elements and destroying them. Dr. W. Duncan had omitted one point, namely, the necessarily imperfect removal of the tube by the vaginal method. As they are part of the uterus, any operation which leaves them behind must be imperfect. This condemns the vaginal method as com-

pletely as the frightful mortality of the abdominal method condemns that operation.

Mr. DORAN believed that there were anatomical reasons against the extirpation of the cancerous uterus. Mierzewsky and Lebec had shown that in the connective tissue between the body of the uterus and peritoneum there is a dense network of lymphatics, whilst two wider lymphatic plexuses form a collar round the uterine and vaginal portions of the cervix. The lowest of these communicates freely with the vaginal lymphatics. All these networks form and empty themselves into two or three large trunks running to the obturator gland, passing along the lower border of the broad ligament. He had felt this gland soon enlarged in cases of cancer of the cervix, though not with the stony hardness like that of cancerous axillary glands, except in advanced cases, where the uterus was already fixed and deeply ulcerated. This disposition of the lymphatics favored the spread of cancerous elements, and the whole of the broad ligaments could not be removed.

Dr. PLAYFAIR agreed with the conclusions expressed in the paper. In the most common form of cancer in which extirpation was most likely to be of value the diagnosis was uncertain till it was too late to operate. Apart from epithelioma, cancer of the cervix was always obscure till fixation occurred, which distinguished it from hyperplasia, etc. The progress of the disease is sometimes surprisingly rapid. In one case seen with Mr. Thornton, one week sufficed to fix a perfectly mobile uterus and to veto the operation. Even in cancer of the body alone he was doubtful whether extirpation is justifiable. He then related a case in which he had suggested extirpation three years ago, and the patient is still alive in comparative comfort, the bleeding having been controlled by insufflation of iodoform and tannin. In epithelioma of the cervix, removal of the diseased tissue and the application of chloride of zinc are the best procedure. He related a case in which the patient remained in comparative comfort four years after this operation, though the disease had recurred. He related a case in which, though the case was well adapted for extirpation, he had advised Sims's operation. The patient went to Sir Spencer Wells, who had, at her request, extirpated her uterus. The disease recurred within a year, and she died. He had no doubt Sir Spencer Wells would acknowledge, in the light of recent experience, that if the patient had been let alone or Sims's operation done, her expectancy of life would have been as good, to say nothing of the risks of the operation.—*Lancet*, January 31, 1885.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

Ingestion of an Enormous Dose of Sulphate of Strychnine without producing Toxic Symptoms.

Dr. LARDIER, in the *Gazette Hebdomadaire* of January 2, 1885, gives the history of a case of a patient suffering with delirium tremens, in which he administered nearly one and two-third grains of the sulphate of strychnia in twenty-three hours. He first employed the drug in delirium tremens in 1880, and since that time has employed it habitually for this condition, always with complete success, and now considers the remedy a specific for the disease. Dr. Luton first called attention to the action of the drug in delirium tremens, and Lardier, acting upon his suggestions, has continued the use of the remedy with marked

success. At first, the drug was used with much hesitancy, but experience demonstrates that, notwithstanding its powerful effects, it can be used without danger if closely watched during its administration.

In regard to the apparently enormous dose above stated, M. Lardier maintains that no substance is used with therapeutic effect in disease until it produces—all things being equal—results similar to those obtained by a therapeutic dose in health.

Though the quantity of the drug administered in the case under consideration is enormous, no possibility of error exists. The preparation was prepared by a careful and reliable pharmacist, and was administered by the wife of the patient scrupulously according to directions. The history of the case is as follows:—

Patient first seen December 4, 1884, and was an inveterate drinker, addicted especially to brandy, and showed unmistakable symptoms of delirium tremens. The strychnia treatment was at once begun, and pills of strychnia containing $\bar{a}\bar{a}$ $\frac{1}{15}$ gr. On the 4th and 5th of December a pill was administered every two hours, day and night. The morning of the 5th, no change being evident, the same dose was maintained, and in addition a hypodermic injection of $\frac{1}{12}$ of a gr. was given in the evening of December 6th. The succeeding night was passed absolutely without slumber, hallucinations persistent. Profuse sweat and red spots were noticeable upon the forehead and upper part of the face.

Two men could with great difficulty restrain the patient at this time.

The dose of $\frac{1}{12}$ gr. of strychnia produced no effect, and it was determined to push the drug to the point of its manifesting its physiological effect. Accordingly, December 6, from 12.30 P. M., $\frac{1}{13}$ gr. was administered every hour. In the evening, at 7.30, the wife of the patient reported him not improved, but suffering cramps in the legs, and stiffness of the jaws. The pills were ordered stopped till the following morning; but at 8.30 M. Lardier was hastily called. The patient, in attempting to walk, had fallen, cut his head, and fractured a rib. Contrary to the report of his wife, no symptoms of strychnia poisoning existed. The pulse was 124, and the body drenched with sweat. $\frac{1}{3}$ gr. of strychnia sulph. was then administered, and effect carefully looked for, but was not manifested. Thirty minutes after $\frac{1}{13}$ gr. was administered by the mouth, in the presence of M. Lardier. The following night was passed without sleep, the patient being still delirious. $\frac{1}{13}$ grain strychnia administered every hour. December 7, at 6 A. M., the patient's pulse was 90; he was calmer, and answered questions intelligently if addressed authoritatively. At 6 A. M. of this day sixteen of the twenty pills contained in the last box had been taken by the patient, the last one being administered by M. Lardier himself. From this time $\frac{1}{13}$ gr. was given every half hour for eleven and one-half hours. In twenty-three hours $1\frac{2}{3}$ grs. were administered by the mouth, and $\frac{1}{3}$ gr. hypodermically. The same pills were continued every half hour until 3 P. M., when the patient requested food. At 4 P. M. he no longer trembled, his gait was steady; movement active, but unflinching. Finally, he became exhausted, and being put to bed, made no effort to rise. He rested some time; during sleep, however, there was a little restlessness, and some incoordination of movement, which at length disappeared, and the night was passed quietly.

At 8 A. M. the patient awoke, requested food, and again went to sleep. At 1 P. M. he again awoke, his mind being entirely clear. At 4 P. M. the pulse was 75, and there existed slight moisture of the skin. The patient remembered nothing that occurred during his attack. Tremor had entirely disappeared, and not the least symptom of strychnia poisoning was evident. December 8, bandages applied to the broken rib; with the exception of the pain due to this cause, the patient was entirely well.

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NEW YORK CITY.

SPRING SESSION, 1885.

The SPRING SESSION of 1885 will begin on Monday, March 16th, and continue twelve weeks. The recitations are under the direction of Prof. DENNIS and Drs. GOLDTHWAITE and GRISWOLD. The regular curriculum includes the following, in addition to the recitations: *Microscopical Examination of Urine*, Prof. JANEWAY; *Surgical Operations on the Cadaver*, Prof. DENNIS; *Operative Midwifery and Gynæcology*, Dr. GOLDTHWAITE; *Post-mortem Examinations*, Prof. JANEWAY; *Exercises in Medical Diagnosis*, Prof. FLINT; *Exercises in Surgical Diagnosis, the Use of Instruments, Surgical Dressings, etc.*, Profs. MOTT, BRYANT, KEYES, and DENNIS, and Dr. ALEXANDER; *Pathological Demonstrations in the Carnegie Laboratory*, Profs. JANEWAY and DENNIS.

An important feature in the Spring Session will be the opening of the Carnegie Laboratory, fully equipped with scientific apparatus. The laboratory building is five stories high, and contains three sets of laboratories with a large auditorium.

In addition to the above, the following lectures and demonstrations will be given:—

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JANEWAY, and ROBINSON,

Clinical Medicine.

PROFS. MOTT, DENNIS,
BRYANT, and KEYES,

Clinical Surgery.

PROF. LUSK,

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PROF. A. FLINT, JR.,

Applications of Physiology to Practice and
Surgery.

PROF. J. L. SMITH,

Children's Clinic.

PROF. BOSWORTH,
Throat Clinic.

PROF. C. A. DOREMUS,
Chemical Laboratory.

DR. BULL,
Eye and Ear Clinic.

DR. BURCHARD,
Surgical Emergencies and Venereal Clinic.

DR. GRISWOLD and ASSISTANTS,
Dissections and Anatomical
Demonstrations.

The private courses, held during the Winter, will be continued during the Spring Session, and special instruction will be given in the Carnegie Laboratories.

Fees for the Spring Session.

Matriculation (Ticket valid for the following Winter)	. . .	\$5 00
Recitations, Clinics, and Lectures	40 00
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